EAST BOAT BASIN

CAPE COD CANAL

SANDWICH, MASSACHUSETTS

RECONNAISSANCE REPORT FOR NAVIGATION IMPROVEMENTS

United States Army
Corps of Engineers
...Serving the Army
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New England Division

JANUARY 1981

EAST BOAT BASIN
CAPE COD CANAL
SANDWICH, MASSACHUSETTS

RECONNAISSANCE REPORT
FOR
NAVIGATION IMPROVEMENTS

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASSACHUSETTS
JANUARY 1981

SYLLABUS

This study investigated the navigational needs at the East Boat Basin, Cape Cod Canal, Sandwich, Massachusetts, to determine the advisability of providing navigational improvements for commercial fishing industry and recreational boating activity.

Since the acquisition and widening of the Cape Cod Canal by the U.S. Army Corps of Engineers in the late 1930s, the commercial fishing and recreational boating activities have steadily increased such that overcrowding of present facilities is experienced. More space is required to provide for present and anticipated needs of these activities.

Stage I planning effort shows a need for navigational improvements at the East Boat Basin. The preliminary plans that were developed appear to be economically justified.

The Division Engineer recommends that Stage II study efforts be initiated for navigation improvements at the East Boat Basin.

EAST BOAT BASIN
CAPE COD CANAL
SANDWICH, MASSACHUSETTS

RECONNAISSANCE REPORT

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EAST BOAT BASIN
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RECONNAISSANCE REPORT

INTRODUCTION

The East Boat Basin is a small harbor located in Sandwich, Massachusetts. It is situated on the south bank of the U.S. Army Corps of Engineers' Cape Cod Canal, near the eastern end of the canal, as shown on Figure 1.

The East Boat Basin was constructed in the late 1930's to provide an anchorage area for the construction vessels which were working on the Corps of Engineers canal-widening project. After completion of the canal-widening, the harbor became part of the Cape Cod Canal Federal project. The harbor was expanded to its present size in 1963.

In the late 1940's the bulkhead at the East Boat Basin was recognized as a convenient fish offloading point by transiting fishing vessels. Since then, commercial fishing operations have developed at Sandwich to a point where expansion of facilities are being considered. Presently a large number of transient vessels and a sizeable local fleet offload their fish at the four fish packing plants, three of which lease their bulkhead space from the Corps of Engineers.

The East Boat Basin is a Corps recreational area also. The Corps' bulkhead has proven to be a very popular fishing spot and favorable location to observe the commercial fishing activities. The Town of Sandwich operates a recreational marina inside the basin. Recreational boating has steadily increased in the canal area and there is constant demand for additional berthing space.

The local people have recognized the present crowded conditions and have proposed expansion of the East Boat Basin. A combination of commercial fishing and recreational boating facilities are desired to meet the future demand of both of these activities.

STUDY AUTHORITY

This study is being conducted under a Resolution of the U.S. House of Representatives Committee on Public Works and Transportation adopted 9 May 1979 which reads as follows:

> Resolved by the Committee on Public Works and Transportation of the House of Representatives, United States, that the Board of Engineers for Rivers and Harbors

is hereby requested to review the report on the East Boat Basin, Cape Cod Canal, Sandwich, Massachusetts submitted in House Document No. 168, 85th Congress, 1st Session, and prior reports with a view to determining the advisibility of modifying the existing project at this time, particularly for the benefit of the existing and prospective commercial fishing and recreational boat fleets.

SCOPE OF STUDY

In order to meet present and future demands, it is the general consensus of local officials and interest groups that the East Boat Basin should be expanded. Additional facilities would relieve present crowded conditions and allow for future growth of both commercial fishing and recreational boating.

In response to the desires expressed by local interests, this study will be conducted to determine if Federal participation in navigational improvements at East Boat Basin is advisable at this time. The study will review the project history; outline the study process and objectives; establish base conditions for environmental, economic, cultural and social impacts; discuss community needs; estimate project costs and benefits; and determine whether further study is warranted. If further study is recommended, its method and scope will be outlined.

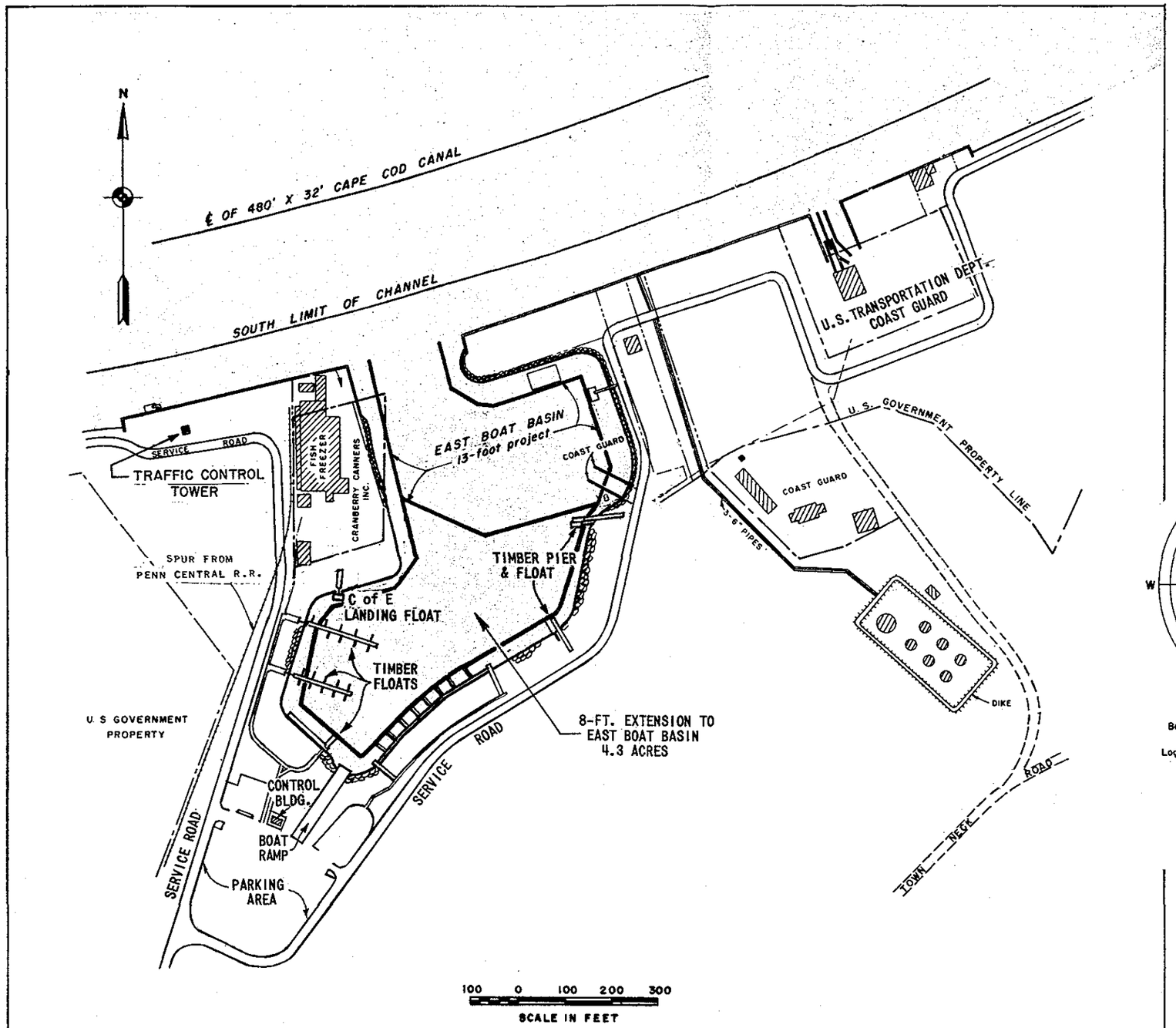
STUDY PARTICIPANTS AND COORDINATION

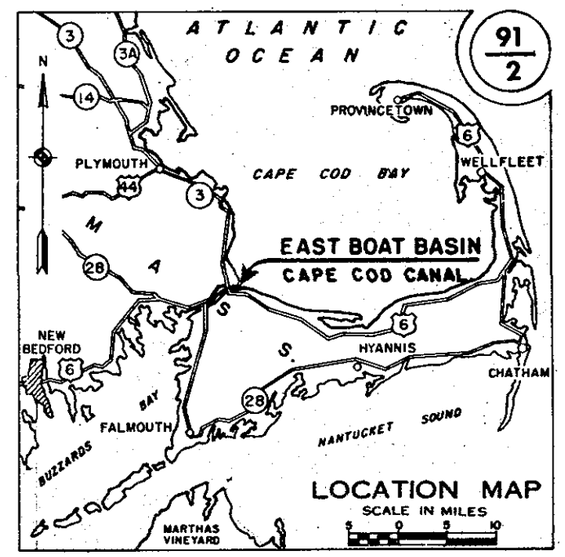
This study is being conducted by the U.S. Army Corps of Engineers, New England Division. Throughout the study, close coordination will be exercised with the officials, agencies and citizens of Sandwich and the surrounding area.

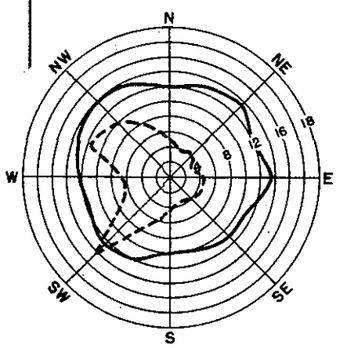
This coordination and information exchange will be accomplished through workshops, mailings and distribution of reports to all interested parties. A letter entitled, "Announcement, Initiation of a Navigation Study for East Boat Basin, Sandwich, Massachusetts" was mailed in early July 1980. This letter and public response is included in Appendix 2.

All State and Federal agencies which have an interest in or are required to input into the study, will be coordinated with.

A major portion of the public involvement will consist of coordination with town officials and local interests. These include the town selectmen, town engineer, harbormaster, various local groups and private individuals. Field trips by Corps of Engineers personnel have been made to gather information and update progress of the study for locals. The most recent field trip presented the draft reconnaissance report to the town officials for review and concurrence of study efforts. A letter of support from them is included with this report.







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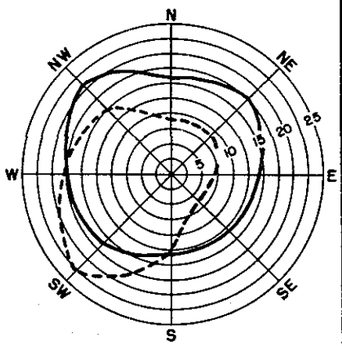


Based on data compiled from observations of the U. S. Weather Bureau at Block Island, Rhode Island, from 1921 to 1939

LEGEND

% Duration – – – –

Average speed (M.P.H.) ————

WIND DIAGRAMS

FOR BOSTON, MASS. AND BLOCK ISLAND, RHODE ISLAND

NAVIGATION STUDY

LOCATION MAP

EAST BOAT BASIN

CAPE COD CANAL, MASS.

30 SEPTEMBER 1976

IN 2 SHEETS SHEET 2

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.

FIGURE 1

PRIOR REPORTS AND STUDIES

Studies of the East Boat Basin, both specifically and in conjunction with the Cape Cod Canal, have been made over the last 50 years. The earliest reports have been done by the Federal Government and recently other interests have made studies of the basin. The following is a list of available reports concerning the Cape Cod Canal and East Boat Basin:

U.S. Government Reports

Report	Subject of Report	Recommendations
History of Operations, published in H. Doc. No. 3, 69th Congress, 1st Session	Acquisition of the Cape Cod Canal by the United States	Favorable
Preliminary examination and survey, published in H. Doc. No. 745, 71st Congress, 3rd Session	Canal with 1 lock, 40 feet deep, 250 feet wide	Do
Survey, review of reports published in H. Doc. No. 15, 74th Congress, 1st Session	Open canal, 32 feet deep, 540 feet wide	Do
Survey, review of reports, unpublished submitted to Congress January 23, 1940	Enlargement of East Boat Basin	Unfavorable
Survey, review of reports, published in H. Doc. No. 431, 77th Congress, 1st Session	Provision of channel 150 feet wide and 15 feet deep, from Wickets Island to town wharf, Onset	Favorable
Survey, review of reports, of East Boat Basin, Cape Cod Canal, Massachusetts NED, 29 June 1956	Expansion of East Boat Basin	Favorable

Report	Subject of Report	Recommendations
Draft - Sandwich Bulkhead Rehabilitation Study, Cape Cod Canal, Sandwich, Massachusetts October 1979, Tibbetts Eng. Corp. for Corps of Engineers	Rehabilitation of the existing bulkhead at the East Boat Basin	Recommends construction of steel sheet pile bulkhead.

Reports By Others

Report	Subject of Report	Recommendations
Feasibility Study, East Boat Basin Expansion, Sandwich, Massachusetts April 1979 Tibbetts Eng. Corp. for the town of Sandwich, Massachusetts	Expansion of East Boat Basin	Highly favorable, dependent upon increase of fish catch

Study findings can be found under Plans of Others section.

WATER AND RELATED LAND RESOURCES PLANNING

Legislative and Executive Policies

The U.S. Army Corps of Engineers Engineering Regulations (ER 1105-2-200 series) established procedures for conducting feasibility studies for planning Federal water and related land resources projects. These procedures are consistent with the requirements of legislative and executive policies including the Water Resources Council's "Principles and Standards for Planning Water and Related Land Resources," the National Environmental Policy Act of 1969, the Clean Water Act of 1977, and other legislative directives. In addition, the planning of Federal Water Resources projects reflects the requirements of Executive guidelines including pertinent Executive Orders.

National Objectives

The Water Resources Planning policy instituted by the Principles and Standards (P&S) for Federal and Federally assisted water related land planning identifies two national goals towards which planning should be directed, and a system of four accounts to measure plan effects. The two national goals towards whose enhancement the formulation of alternatives will be directed are National Economic Development (NED) and Environmental Quality (EQ). The national objective of economic development is achieved by increasing the value of the nation's output of goods and services and improving national economic efficiency. The national EQ objective is to enhance the quality of the environment through the management, conservation, preservation, creation, restoration, or improvement of the quality of certain natural and cultural resources and ecological systems.

The system of accounts to be established displays the beneficial and adverse effects of each alternative plan for the NED and EQ national goals, and for the categories of Regional Development (RD) and Social Well-Being (SWB) toward providing a basis for plan comparison and decision-making. Contributions to RD are determined by evaluating a proposal's effects on a region's real income, employment, population, economic base environment, and social development. Contributions to the SWB are determined by evaluating a proposal's effects on real income, security of life, health and safety, education, cultural and recreational opportunities, emergency preparedness, and other factors.

Corps of Engineers Planning Process

The Corps of Engineers planning procedures establish a planning framework to guide planning for the conservation, development, and management of the water and related land resources. The framework requires the systematic preparation and evaluation of alternative ways of addressing problems, needs, concerns, and opportunities under the P&S objectives of NED and EQ. This results in information necessary to make effective choices regarding resource management under existing and projected conditions. Alternative plans are formulated without bias to structural or nonstructural measures.

Plans are developed in three stages, initial, intermediate, and final. During the initial stage, planners establish base conditions, determine area needs and formulate a conceptual plan of the study to guide subsequent planning. During the intermediate stage, a broad range of plans is developed and analyzed. In the final stage, plans are screened and detailed plans are developed to furnish a basis for selection and recommendation of a final plan of improvement. During each stage, four functional planning tasks are accomplished. They are problem identification, formulation of alternatives, impact assessment, and evaluation. The four planning tasks are emphasized in varying degrees in the different planning stages. Problem identification is the most important task during Stage I studies, whereas the emphasis shifts more toward formulation of alternatives in Stage II. Figure 2 shows the relative emphasis placed on each task during the various study stages. On the figure, the relative amount of emphasis placed on each task is indicated by the size of the block as compared to the size of the other blocks in that stage. A higher level of detail for data and analysis and more precise alternative plans are obtained as the study progresses through each plan development stage. The process of iterating the four planning tasks in each stage provides flexibility to the study to be receptive to changing needs, rising opposition, or support for modified alternatives. Further, this approach provides a systematic planning process to allow for review by higher Corps of Engineers echelon and public interests, and to facilitate study management.

Stage I - Reconnaissance

The general purpose of this stage is to make an initial analysis of water and related land resource management problems and needs, and preliminary solutions to determine whether additional study is warranted and to develop a study program for subsequent planning. During this initial stage, the four planning tasks are performed at a preliminary level of detail to define the scope and character of the study and delineate planning objectives, including the range of issues related to resource management in the study area and the alternative solutions to these issues. Because of the introductory nature of the planning tasks at this stage, the effort generally involves gathering and analyzing a wide range of available information and public views and desires. The product of this stage is a Reconnaissance Report which documents the Stage I findings and either presents the justification, programs and cost schedule for further study or recommends that no further study presently be directed.

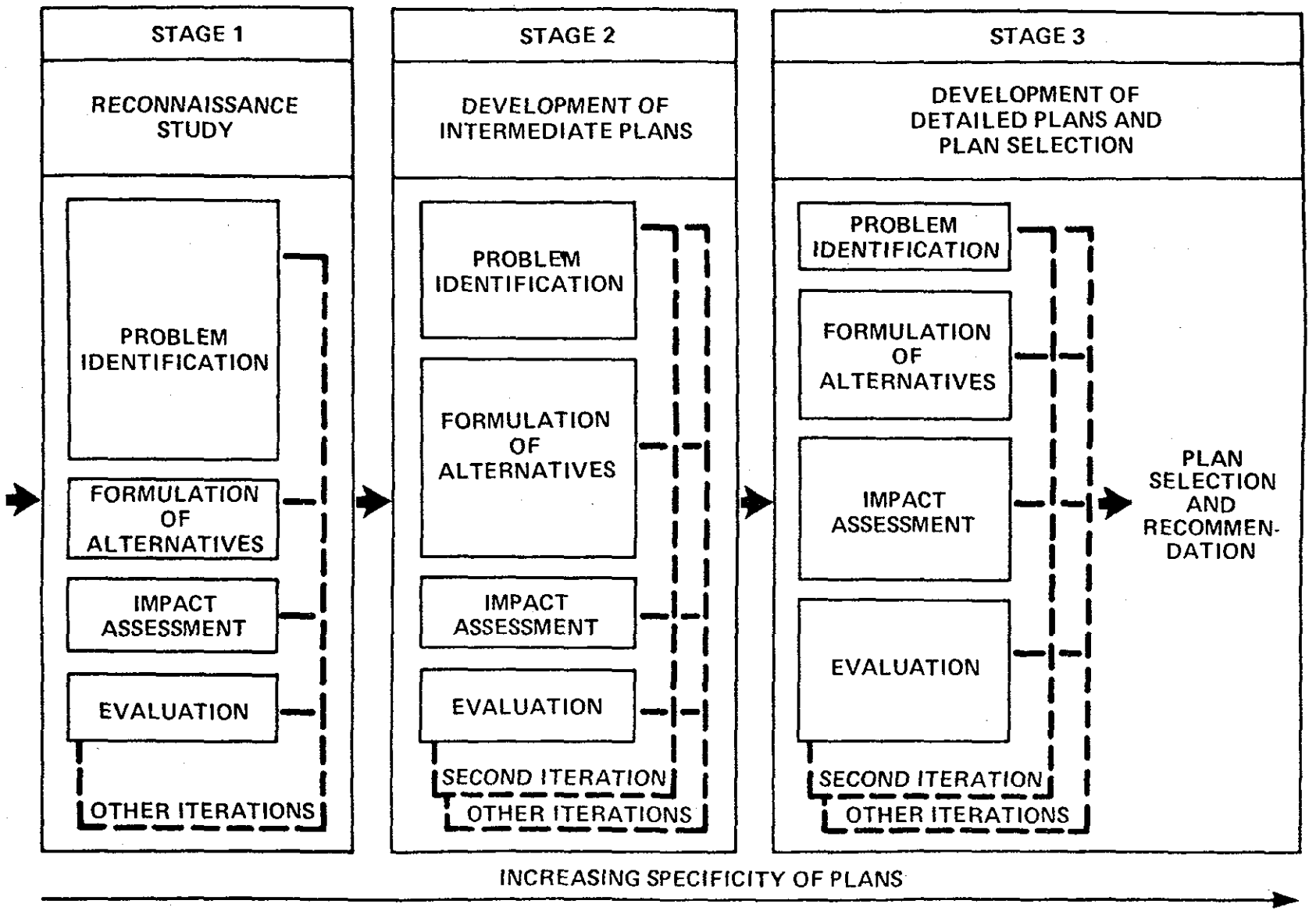


FIGURE 2-GENERAL RELATIONSHIP OF PLAN DEVELOPMENT STAGES AND FUNCTIONAL PLANNING TASKS

PROBLEM IDENTIFICATION

The major emphasis of the reconnaissance stage of a study is placed upon problem identification. This section will familarize the reader with the existing conditions of the study area, including environmental, economic, cultural and sociological conditions. Public concerns will be identified. Planning constraints, planning objectives and future conditions will be discussed.

THE STUDY AREA

Cape Cod is one of the fastest growing recreational areas in New England. It derives a major portion of its summer economy from the tourist industry. The Cape Cod area is also a major fishing area of New England. One of the focal points of Cape Cod is the Cape Cod Canal which attracts both of these activities. The East Boat Basin is one of the major facilities used by vacationers and commercial fishermen in the canal region.

With the influx of summer vacationers, the recreational boating activity greatly increases. The East Boat Basin provides a protected area where boats can be launched and berthed. Even with approximately 80 slips for recreational craft, there is great demand for additional slips.

Since the canal was widened in the late 1930's, commercial fishing interests have recognized the potential of the East Boat Basin. The bulkhead at East Boat Basin is a major fish offloading point. The canal allows fishing vessels to move between fishing grounds easier, and transiting vessels from other ports find Sandwich a convenient offloading point (i.e. many offloading fishing boats are based at New Bedford). It can be reasonably anticipated that fishing boat traffic through the canal will increase. The 200 mile fishing limit will cause more and larger fishing vessels to transit the canal while travelling to distant fishing grounds.

COMMERCIAL FISHING INDUSTRY

The East Boat Basin at Sandwich is the second largest fishing port on Cape Cod and the fifth largest in Massachusetts, in terms of pounds of fish landed. There is a substantial local fleet of approximately 40 commercial vessels. Inshore draggers and sea scallopers account for about 50% of the fleet, while the other 50% consists of lobster boats.

There are many transient commercial vessels from other ports as far away as North Carolina which offload fish at Sandwich. The commercial fishing vessel operators find Sandwich a convenient offloading point during their travels to and from fishing grounds and fishing ports.

There are presently four fish handling facilities situated on the bulkhead at the East Boat Basin. These facilities handle all the fish that is offloaded at Sandwich. In 1979 a total of 17,488,000 pounds of

fish were reported to have been landed, and was valued at $9,848,000. the major species landed include flounder, cod, haddock, scallops and lobster.

Conditions are crowded, particularly during offloading when many vessels are rafted together while waiting to offload. Currents and potential collision with boats entering or leaving the East Boat Basin can make offloading a tricky and hazardous operation.

Expansion of the East Boat Basin and development of more offloading facilities would alleviate the crowded conditions and reduce the hazards presently associated with offloading. More space will allow an influx of fishing vessels to use the basin, which would further develop and establish Sandwich as a commercial fishing port.

ECONOMIC AND SOCIOLOGICAL CONDITIONS

Introduction

This phase of the East Boat Basin Study will describe the social and economic aspects of the study area. The first part of this section will describe the study area, its population, economy and land use characteristics. The second part will describe the "most probable future" of the study area, any expected future growth and development.

The Baseline Condition

Population

The population of Sandwich has grown at a rapid rate far in excess of the growth rate experienced in Massachusetts, New England, and the United States. Between 1950 and 1970 the town's population increased from 2,418 to 5,239, 117 percent. The rapid growth trend witnessed in Sandwich is also evident in Barnstable County. From 1950 to 1970, Barnstable County grew from 46,805 to 96,656 showing a 106 percent increase. During the same period, the state increased by only 21 percent. Population growth trends for Sandwich, Barnstable County and the Commonwealth of Massachusetts are presented in Table 1.

Population figures for Cape Cod can be deceiving if the significant seasonal fluctuations consistent with a summer resort area are not taken into consideration. Population in Sandwich and Barnstable County begins to grow gradually in April, peaks in July and August, and declines to its year-round population level in early November. Peak seasonal population in Sandwich increases by a multiple of up to 2.6 times the year round population and anywhere from 2 to 9 times throughout Barnstable County with an average growth multiple of 3.0.

Table 1

Population Growth Trends
(Year Round Population)

	Sandwich	Percent Change	Barnstable County	Percent Change	Massachusetts	Percent Change
1950	2,418		46,805		4,690,514	
1960	2,082	-13.9	70,286	50.1	5,148,578	9.7
1970	5,239	151.6	96,656	37.5	5,689,170	10.4
1980	8,709	66.2	147,591	52.7	5,728,288	.7

Another characteristic of the population of Sandwich and Barnstable County is the increasing percentage of residents 65 years of age and over. Between 1970 and 1975, Sandwich's 65 and over population grew from 577 to 856, an increase of 48 percent. This compares to a 6.2 percent increase statewide for the same age category. For Barnstable County the 1970 to 1975 increase was also 48 percent. Table 2 provides the relevant data.

Table 2

Population Aged 65 and Over 1970-1975

	1970	1975	Percent Change
Sandwich	577	856	48.4
Barnstable County	16,348	24,265	48.4
Massachusetts	633,383	672,954	6.2

Source: Cape Cod Planning and Economic Development Commisision

Economic Structure

Industry

The economic structure of the town of Sandwich and Barnstable County share a common characteristic: they are tourist dependent economies with a seasonal peak in activity during July and August. Those employment sectors related to tourism, such as wholesale and retail trade and services are the two largest employers in both the town and county, and continue to grow with both year-round and seasonal populations. The wholesale and retail trade sector includes any food or clothing stores, department, chain, or discount stores, novelty shops, antique shops, gift shops, gas stations and sales outlets for recreational equipment. The service sector includes motels, hotels, and lodgings of all types, restaurants, health care institutions, recreational and entertainment facilities, fire and police departments and all trades.

TABLE 3

EMPLOYMENT BY INDUSTRY

	1970	1971	1972	1973	1974	1975	1976	1977	Percent Change 1970-1977
Total Employment	497	495	551	600	644	662	792	869	74.8
Agri., Forestry, Fishing	19	25	23	15	21	20	21	13	31.5
Mining	0	0	0	0	0	0	0	0	0
Contract Construction	68	46	59	83	54	39	52	49	27.9
Manufacturing	14	42	40	37	31	8	11	15	7.1
Tran., Comm., Utilities	4	3	3	5	10	11	13	16	30.0
Wholesale/Retail	221	222	215	199	257	291	340	413	86.8
Finance, Insurance & Real Estate	49	52	62	72	82	80	77	82	67.3
Services	121	105	150	189	189	213	278	281	132.2

Source: Cape Cod Planning and Economic Development Commission

Between 1970 and 1977 the total annual average employment in Sandwich rose from 497 to 869, an increase of 75 percent. Contributing to that total increase was a combined growth in the wholesale and retail trade sector and the services sector of 103 percent. Employment figures for on these sectors is further illustrated by the fact that in 1977, they combined to provide 80 percent of all employment offerings in the town of Sandwich and 67 percent in Barnstable County.

Although many of these wholesale and retail trade establishments and services are available to the population on a year-round basis, closer inspection of employment by industry indicates that significant increase in activity occurs during the summer months. Sandwich's seasonal peak was in July and August, at which time the wholesale/retail trade and services sectors combined to offer 83 percent of all employment. In Barnstable County, these tourism-related sectors offer 85 percent of all employment during the seasonal peak.

As Table 4 illustrates, the 1977 seasonal low point for employment in Sandwich was in February and the high point in August at an increased level of 76 percent. The seasonal low point and peak for 1977 for employment in the wholesale and retail trades sector occurred in February and August reflecting a growth of 100 percent. In the services sector, employment grew 78 percent from a January lull to a September peak.

Seasonal fluctuations are even more dramatic when witnessed at the county level, with an 80 percent growth in total employment from the February low to the August peak in 1977. Employment in wholesale and retail trade reached a low point in February and increased by 138 percent in the summer months. In the services sector, a 107 percent increase occurred between the August high and January low. Table 5 illustrates these findings.

Other major employment sectors in Sandwich and Barnstable County are: transportation, communication, and utilities sector; construction, and finance, insurance, and real estate. Employment in these sectors is also subject to seasonal fluctuations with peak occurring in different months of each year, often outside of the peak months.

In light of all these statistics, it becomes apparent that employment in Sandwich and to an even greater extent, Barnstable County undergoes a significant increase during the summer months because the economic structure of the area is heavily based on those sectors related to tourism. Increase in summer population results directly in an increase in employment and aggregate income for the entire area.

TABLE 4

EMPLOYMENT BY INDUSTRY - 1977

Sandwich

	Low	High	Percent Increase	Average
Agriculture, Forestry & Fishing	1 - Feb.	23 - Oct.	2000	13
Mining	-	-	-	-
Construction	27 - Feb.	61 - Aug. Sept.	125.9	49
Manufacturing	10 - Jan.	21 - Aug.	110.0	15
Transportation, Comm., Utilities	6 - July Aug.	19 - Jan. May	216.6	16
Wholesale Trade/Retail	227 - Feb.	556 - Aug.	100.7	413
Finance, Ins. & Real Estate	78 - May	90 - Dec.	15.3	82
Services	199 - Jan.	355 - Sep.	78.3	281
TOTAL	621 - Feb.	1,093 - Aug.	76.0	869

Source: Cape Cod Planning & Development Commission

TABLE 5

EMPLOYMENT BY INDUSTRY - 1977

Barnstable County

	Low	High	Percent Increase	Average
Agriculture, Forestry & Fishing	294 - Feb.	757 - July	157.4	581
Mining	17 - Jan.	26 - July	52.9	22
Construction	1,679 - Feb.	2,605 - Oct.	55.1	2,259
Manufacturing	2,145 - Apr.	2,594 - Aug.	20.9	2,360
Transportation, Comm., Utilities	2,240 - Feb.	2,798 - Sept.	24.9	2,551
Wholesale Trade/Retail	11,111 - Feb.	26,499 - July Aug.	138.1	18,805
Finance, Ins. & Real Estate	1,764 - Feb.	2,090 - July	184.8	1,936
Services	6,489 - Jan.	13,480 - Aug.	107.7	9,743
TOTAL	25,962 - Feb.	46,761 - Aug.	80.1	36,049

Source: Cape Cod Planning and Economic Development Commission

Labor Force

Data on employed civilian workers by occupational groups were made available in the 1970 Census of Population. The largest group of workers were craftsmen, foremen, and kindred at 17.2 percent, followed by clerical and kindred workers at 15.4 percent and professional, technical and kindred workers at 14.6 percent. These three groups make up about 47 percent of the total employed. Table 6 provides the complete breakdown of occupational categories.

Unemployment is a major problem facing the labor force in both Sandwich and Barnstable County. In 1979, 11.7 percent of approximately 2,859 members of the town's labor force was unemployed while 7.3 percent of the 66,199 members of the county's labor force were not employed. The severity of the problem is obvious when a comparison is made with the statewide 1979 unemployment rate of 5.6 percent. In general, unemployment trends over time in Sandwich and Barnstable County correspond with the pattern of increase and decline that exists on a state or national scale, but at a significantly higher level.

Seasonal fluctuations in the Cape Cod economy intensify the problem, usually causing unemployment to soar in the off season for tourism. In most years, the seasonal unemployment low point occurs in July or August. In 1979 the seasonal low point occurred in August in Sandwich (at 6.5 percent and Barnstable County at 4.0 percent). The high points in unemployment occurred in January in Sandwich and Barnstable County at 21.3 percent and 13.9 percent respectively. These unemployment rates are high in comparison to the statewide rate of 7.5 percent. The relevant data is presented in Table 7.

Income

Per capita income also serves as an indicator of the general state of the regional economy. In 1969, per capita income in Sandwich was $3,123 and the latest available estimate for 1974 was $4,445, with Sandwich ranking 13th in the county. In Barnstable County, where many towns rank well above the statewide per capita income level, the 1969 figure was $3,427 and the 1974 level $4,779; Barnstable County ranking fourth of the 14 Massachusetts counties. The statewide levels of per capita income for 1969 and 1974 were $3,425 and $4,755 respectively. Thus, per capita income growth over that five year interval was 42 percent in Sandwich and 43 percent in Barnstable County comparing favorably with 38 percent growth in Massachusetts.

Housing

The 1970 Census indicated that 84.8 percent of the housing units in Sandwich were single family structures. Five point one percent were two family dwellings with close to 6 percent of the structures housing 3 to 19 families. From a total of 2,368 housing units, 1,666 are year-round housing units leaving 702 seasonal or migrating units. Table 8 shows the pertinent data.

TABLE 6

Occupations, Sandwich

(Employed Persons 16 Years Old and Over)

Groups	Number 1970	Percent
Prof., Tech., and Kindred	195	14.6
Managers & Administrators	181	13.6
Sales Workers	134	10.0
Clerical and Kindred	205	15.4
Craftsmen, Foremen, Kindred	229	17.2
Operatives	129	9.6
Laborers	39	2.9
Farmers and Farm Laborers	26	1.9
Service Workers	192	14.4
TOTAL	1,330	99.6

Source: U.S. Census, 1970

TABLE 7

1979 UNEMPLOYMENT RATE

Sandwich, Barnstable County, Massachusetts

	Sandwich	Barnstable County	Mass.
January	21.3	13.9	7.5
February	19.0	12.2	6.6
March	18.6	12.0	6.7
April	12.3	7.7	5.3
May	10.2	6.3	5.0
June	7.9	4.9	5.1
July	6.8	4.2	5.0
August	6.5	4.0	4.7
September	10.0	6.2	6.4
October	8.2	5.1	4.4
November	10.8	6.7	4.8
December	12.5	7.9	5.1
Average	11.7	7.3	5.6

Source: Cape Cod Planning and Economic Development Commission

Table 8

Housing Types
Sandwich, Massachusetts 1970

Units	Number	Percent Total
1	1,414	84.8
2	85	5.1
3 and 4	92	5.5
5 to 19	75	4.5
20 or more	-	-
Mobile Home/Trailer	-	-
TOTAL	1,666	99.9

The Cape Cod Planning and Economic Development Commission shows that the number of housing units has been increasing since 1970. From 1970 to 1976, there was a 59 percent increase in the number of housing units. A majority of the increase occurred in the construction of year-round housing units as opposed to seasonal units. This trend is expected to continue as more people permanently reside in Sandwich. Housing trends for the county and town are shown in Table 9.

Table 9

Housing Units
Sandwich, Massachusetts

	1970	1976	Percent Increase
Sandwich	2,197	3,489	58.8
County	64,759	88,128	36.0

Land Use

The largest portions of Sandwich and Barnstable County remain in an undeveloped natural wilderness state, a fact that accounts for much of the region's attractiveness as a vacation resort area. As Table 10 illustrates, forests and wetlands cover approximately 74 percent of Sandwich's surface area and 72 percent of Barnstable County's. Of the developed land, the largest share is devoted to residential use; 10 percent in Sandwich and 14 percent in Barnstable County. All other urban land uses, including commercial, industrial, transportation, and public institutional account for a very small portion of the land area throughout Cape Cod. Agriculture and open space cover about 7 percent of Sandwich's land area and 8 percent of the county's. It is important to note that 9,416 acres in Sandwich or 33 percent of the land is controlled by the Federal Government at Camp Edwards and Otis Air Force Base.

Table 10

1972 Land Use
Sandwich and Barnstable County

	Sandwich		Barnstable County	
	Acres	Percent	Acres	Percent
Urban Land	4,431	15.5	48,869	17.2
Residential	2,761	(9.7)	39,986	(14.1)
Transportation	311	(1.1)	2,801	(1.0)
Commercial	54	(.1)	2,287	(.8)
Industrial	81	(.3)	489	(.2)
Open and Public	1,224	(4.3)	3,356	(1.2)
Mining, Waste Disposal	199	.6	1,659	.6
Agriculture, Open Land	2,063	7.2	22,848	8.1
Outdoor Recreation	684	2.4	6,255	2.2
Wetland	2,282	8.0	47,841	16.9
Forest Land	18,824	66.0	156,097	55.0
Total	28,484	100.0	238,569	100.0

Source: Cape Cod Planning and Economic Development Commission

Because such a large percentage of the region remains undeveloped, and there are projections for accelerated growth of year-round and summer populations, rapid changes in patterns of land use are possible. In fact, in the past ten to fifteen years there has been a sizeable increase in residential development. It has been higher recently than in the past, primarily in residential single family homes. However, Sandwich's development is hindered by environmental considerations, lack of a large year-round population to support development and lack of adequate waste disposal sites.

The Basin

The East Boat Basin in Sandwich is the fifth in the state and 35th in the nation in fish landings. The original basin was constructed by the U.S. Army Corps of Engineers in the late 1930's as a safe harbor. In 1963 an expansion was undertaken to double the size of the basin. Today the basin has a surface area of about 7 acres. Depth is 13 feet at mean low water in the deepest segment of the basin and 8 feet in the rest. One finds that the East Boat Basin is a desirable location for commercial fishing operations for the following three reasons: (1) its access to the north and south fishing grounds, (2) its close proximity to Boston and Providence, and (3) the fact that it is an ice free area (see Figure 3). The East Boat Basin includes a marina, and boat ramp, a marina pier with a float, a service pier and float, a Corps of Engineers pier and float, Coast Guard piers and a pier for commercial fishing vessels. Within close proximity to the basin is a residential area and scattered commercial businesses including restaurants and a bakery. Presently, due to overcrowded conditions, the basin is not able to accommodate the increasing commercial and recreational fleet.

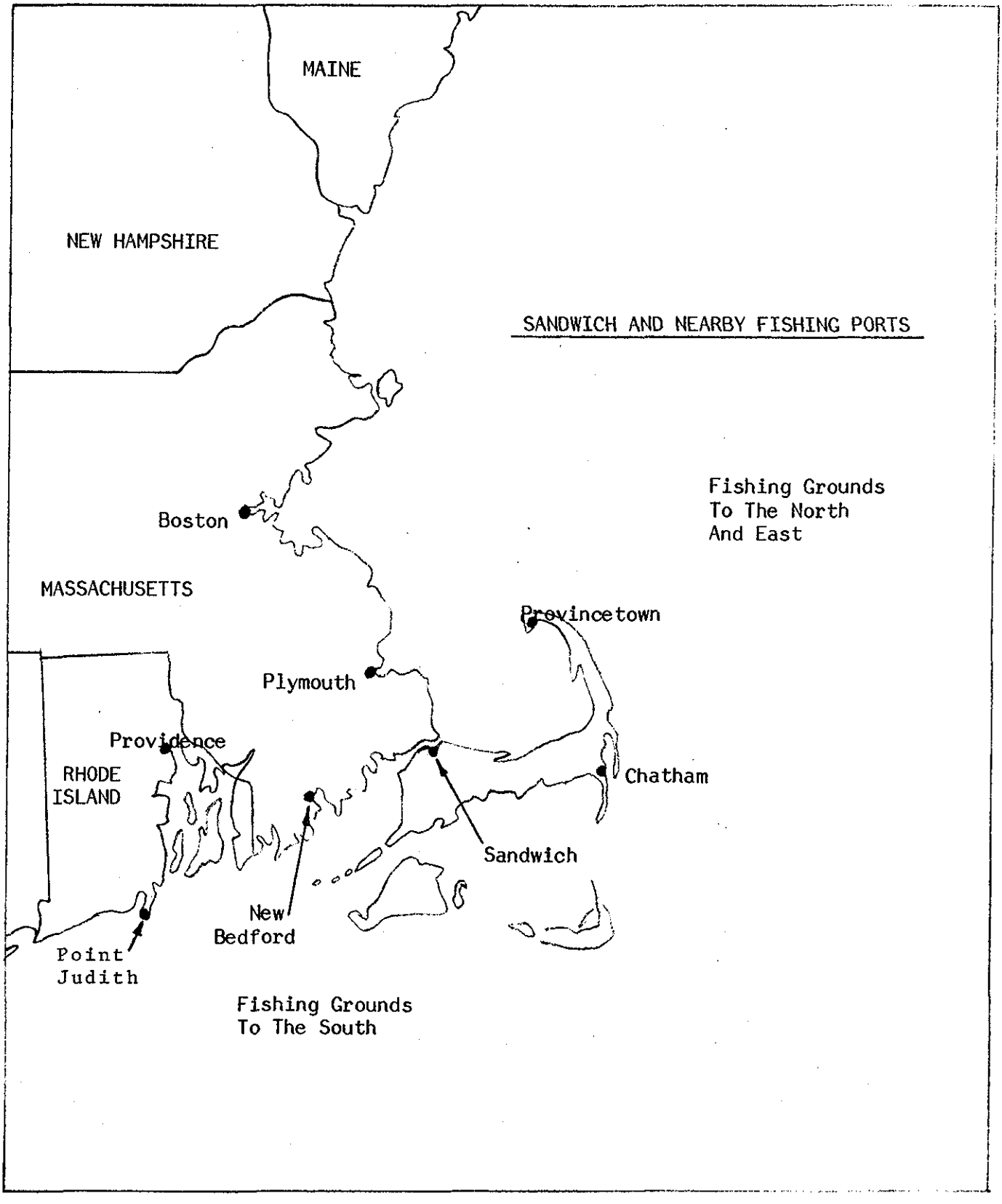

MAINE
NEW HAMPSHIRE
SANDWICH AND NEARBY FISHING PORTS
Fishing Grounds
To The North
And East
Boston
MASSACHUSETTS
Provincetown
Plymouth
Providence
RHODE
ISLAND
Chatham
Sandwich
New
Bedford
Point
Judith
Fishing Grounds
To The South

FIGURE 3

Future Growth and Development

The "most likely future" for Sandwich suggests continued growth. Projections prepared by the Cape Cod Planning Commission indicate the following year-round populations for Sandwich.

1985	9,000
1990	10,300
1995	11,000

Excluding Population from Otis Air Force Base

A population of 11,000 in 1995 would be 110 percent increase from the 1970 population. Population growth projections reflect in part the growing attraction of Cape Cod's rural seaside charm to people seeking a place to retire. It also reflects Sandwich's attraction as a place to live for people still in the labor force who hold jobs outside Barnstable as far north as Boston and west as Providence. It is felt that Sandwich is now becoming less of a retirement community and more of a bedroom community. Lastly, Sandwich has become attractive because of the low tax rate.

It is expected that Sandwich will continue to rely heavily on services and wholesale/retail employment although those residents employed in the town of Sandwich will continue to decrease. Employment in agriculture, forestry, fishing and manufacturing is expected to decrease. Recent patterns show that there has been growth in the number of people in Sandwich without growth in employment opportunities.

A look at Sandwich's Local Growth Policy Statement reveals the goals and policies to guide future growth and development of the town. A primary goal supported by the growth policy statement is to encourage and maintain Sandwich's existing unique historic village, recreational, vacation, environmental and governmental attributes and traditions while keeping the community in economic balance. In accomplishing this end, Sandwich as the "oldest town in Cape Cod," desires to encourage tourism. Commercially, there has been an increase in banks, real estate, antique shops, stores, restaurants and tourist oriented structures. Commercial growth downtown has not changed significantly and is not expected to do so in the future. While commercial development to serve the permanent communities and visitors is predicted for the future, it is expected to be less than residential growth. With a projected major increase in the winter populations an increase in housing units is foreseen. A housing boom is expected to occur between 1980 and 1985; however, this increase will be smaller than the one that occurred between 1970 and 1976. In the past, development in single family structures has occurred; however, more multi-family dwellings are expected to be built in the future. Little or no industrial growth is expected to occur in Sandwich. The Canal Electric Company is important to the economy of the town of Sandwich since it comprises 38 percent of the tax base, but it has had little affect on employment.

ENVIRONMENTAL CONDITIONS

Environmental Setting

General

The East Boat Basin is located along the south side of the Cape Cod Canal, near the eastern entrance to the Canal from Cape Cod bay. It is in the town of Sandwich, approximately 50 miles southeast of Boston. The Cape Cod Canal is a sea level canal, and extends from Cape Cod Bay on the east to Buzzards Bay on the west.

The original East Boat Basin had an area of about 2.7 acres and a depth of 13 feet. It was expanded to the south and southwest by approximately 4.3 acres in area and 8 feet deep, about 20 years ago. Figure 1 shows the East Boat Basin and its location on the Canal.

The Basin is used by the United States Coast Guard, Corps of Engineers and numerous commercial fishing boats, as well as permanent and transient recreational craft. The area is one of the best locations on the east coast for a year-round, ice-free harbor of refuge and refueling. The mean tidal range in the Basin is 9.4 feet. Portions of the East Boat Basin are leased by the Corps to the town of Sandwich. Mooring and berthing spaces are under the management of the Sandwich Harbormaster.

Topography and Geotechnical Features

The terrain surrounding the Cape Cod Canal consists of rolling hills; the highest is 177 feet above mean sea level. The soil is predominantly sandy with rocks and stones, and the area is well forested.

The site of the East Boat Basin expansion is generally flat and largely covered with fill from the initial expansion of the Basin and the construction of the nearby power plant. Since Cape Cod was formed during the last advance of the continental ice sheet more than 10,000 years ago, the natural soils at the site are outwash and glacial lake deposits. Upper portions of the soil profile are predominantly glacial outwash silts, sands and gravels overlying layers of peat and clay and silt deposits. The deeper soils are highly overconsolidated, probably due to a readvance of the ice sheet after deposition.

Climatology

The Cape Cod climate offers very comfortable spring, summer and autumn temperatures. The winters are cold, often with subfreezing readings. At all seasons, however, the climate is more moderate than at nearby inland locations. The average January and July temperatures at the East Wareham Weather Station are about 29°F and 71°F, respectively. Extreme temperatures have been recorded at -24°F and +99°F. Precipitation is well distributed throughout the year and averages about 47 inches.

Aquatic Ecosystem

The Cape Cod Canal waters are designated as SB quality, which means they are "suitable for bathing and recreational purposes including water contact sports; industrial cooling; excellent fish habitat; good aesthetic value; and suitable for certain shell fisheries with depuration."

The Canal is one of the most prolific and fruitful sport fisheries in New England. It offers many different types of fish, with the most common, in terms of catch, being Atlantic cod (Gadus morhua), Atlantic mackerel (Scomber scombrus), winter flounder (Pseudopleuronectes americanus), pollock (Pollachius virens) and tautog (Tautoga onitis). Other species caught include striped bass (Morone saxatilis), bluefish (Pomatomus saltatrix), rainbow smelt (Osmerus mordax), chub mackerel (Scomber japonicus), blue runner (Caranx crysos), Atlantic tomcod (Migrogadus tomcod), red hake (Urophycis chuss) and American eel (Anguilla rostrata).

Fairly abundant fish with little or no commercial or sport fishing value are cunner (Tautogolabrus adspersus), Atlantic silverside (Menidia menidia), rock gunnel (Pholis gunnellus), longhorn sculpin (Myoxocephalus octodecemspinosus) and grubby (Myoxocephalus aenaeus).

Alewives (Alosa pseudoharengus) gather during April, May and June at the Bournedale Herring Run, several miles west of the Boat Basin. Schools of juvenile clupeid fish, including Atlantic herring (Clupea harengus harengus) and Atlantic menhaden (Brevoortia tyrannus) occur in the Canal during late summer and early fall.

The Cape Cod Canal contains a diversified population of benthic flora and fauna with representatives of both the Cape Cod Bay and Buzzards Bay waters. Sampling conducted in the late 1960's found approximatley 100 species of invertebrates, 26 species of algae and one flower macrophyte in areas of the Canal. The primary difference from one end of the Canal to the other is abundance rather than species composition, with decreasing numbers from west to east corresponding to the transition from a more rocky bottom at Buzzards Bay to a more sandy, gravelly substrate to the east. The canal waters do not contain a large shellfish population.

Terrestrial Ecosystem

The site of the proposed East Boat Basin expansion is generally covered with grasses and bushes. Northern bayberry (Myrica pensylvanica) is common. Near the center of the site a small open wet area is surrounded by phragmites (Phragmites communis) and a narrow ring of saltmarsh cordgrass (Spartina alterniflora). It is doubtful that the site contains any significant wildlife habitat or value.

Threatened and Endangered Species

There are no known threatened or endangered species of plants or animals inhabiting the waters of the current East Boat Basin or the area of the proposed East Boat Basin expansion.

Recreation and Natural Resources

The East Boat Basin is one of the most heavily utilized recreation facilities along the Cape Cod Canal. Annual visitation, in addition to recreational boating, averages about 250,000 people with sightseeing accounting for more than 50%, while bicycling, fishing, jogging and picnicking make up the other primary recreation activities. Picnic and sanitary facilities, along with adequate parking, are available at public use areas on both the east and west sides of the Boat Basin. Fishing is permitted off the bulkhead in the Canal, but not in the Basin itself. The Corps of Engineers service road along the south side of the Canal extends from the East Boat Basin to the railroad bridge and is very popular for jogging and bicycling.

Historic and Archaelogical Resources

The area of proposed expansion is composed largely of fill from construction of the existing Boat Basin and the nearby power plant. This fill extends to the present water table over much of the site. Therefore, intact historic or archaeological resources are extremely unlikely to exist in this location. Disposal strategy for the material from the proposed project, both excavated and dredged, has not been determined as yet. Examination of disposal sites may be necessary to determine if any historic or archaelogical resources are present.

CONCERNS, NEEDS AND OPPORTUNITIES

In order to address the water and related land resource management problems of the study, the concerns, needs and opportunities must be identified. The general public, interest groups and government agencies have been consulted to obtain their views regarding what items the study should address.

Identification of concerns, needs and opportunities helps in formulation of preliminary plans. The need and type of improvement cannot be determined unless the previously mentioned items are known. The following concerns, needs and opportunities have been identified for this study.

The primary concern expressed by local interests is that present conditions are very crowded. There is a great need to provide more berthing and offloading space for commercial fishing vessels. The recreational boating area requires the capability to store more recreational boats, by increased berthing area or other possible methods.

Expansion of the East Boat Basin provides a great opportunity for socioeconomic development in Sandwich. Sandwich has bought 22 acres of land for this purpose. If provisions for meeting future demands are implemented, the commercial fishing industry can grow. With the additional shore facilities, more commercial fishermen and marine related businesses would develop. This would result in more jobs for townspeople and increased revenues derived from taxes, leases, ramp fees and docking fees, etc.

Environmental concerns are important. Dredging material disposal and coastal development have to be monitored closely in order to reduce adverse impacts to wetland and ocean environments. A large amount of excavated material will be generated. The ocean disposal of this material should be restricted as much as possible. One suggestion that may have merit would be to use the material as fill for the extension of Route 28. This type of project requires coordination with the appropriate State and Federal agencies, to determine if all agency policies are consistent with each other.

There are three fish packing operations that lease bulkhead space from the Corps of Engineers. There is one fish packer that owns bulkhead land. The possibility of moving some or all of these operations into the expansion could be desirable. One problem identified was the hazard of off-loading, particularly with several fishing vessels together, along the canal bulkhead due to currents and close proximity to the basin entrance. Another item to think of is that the existing fish packers could expand operations, along with newly established fish packers. And finally the Corps of Engineers could utilize the vacated bulkhead space for recreation. A movement of fish packing operations inside the basins would enable these options to be implemented.

The type of facilities is a concern in the overall project. Local interests desire facilities for repair of vessels, parking space, rock storage and fish processing plants. Adequate water, electrical and sewer service should be required in a project of this scope.

It was questioned whether the basin would become congested. This problem could have an impact on safety of navigation. Plans that will be developed should minimize problems impacting upon safety of navigation.

With the development of many alternatives, a variety of cost-sharing breakdowns (local cost/Federal cost) will result. This may concern the local interests because economic constraints may make an impact on a local decision on the type of plan desired.

An expansion project at Sandwich is expected to bring about a tripling of annual fish landings. Quotas or depletion of fishery resource due to overfishing may have an impact on the future development of commercial fishing at the basin. Amount of available resource is a concern that will be difficult to assess. The 200 mile fishing limit may help to replenish the depleted fish resource.

Local interests prefer bulkheads for bank stabilization. Riprap is inefficient as far as space requirements and rats have been known to inhabit the riprap.

CONDITION IF NO FEDERAL ACTION IS TAKEN

Two things may occur, if no Federal action is taken. The East Boat Basin will remain as it is, or the town of Sandwich may proceed with basin development on its own.

The first possibility will mean no commercial expansion to meet future demands. The basin fishing operations would probably remain the same as at present. Recreational boating, launching of trailerable boats on a daily basis, may increase, but total anchorages for recreational boats will not.

The second possibility, the town of Sandwich developing the basin, would change the present conditions according to the degree of improvement. The degree of improvement would depend upon the town of Sandwich obtaining sufficient funds for a maximized project. This appears to be highly unlikely. Therefore Federal (Corps of Engineers) participation in developing the East Boat Basin is highly desirable. This participation would result in maximizing the development of the East Boat Basin as a viable commercial fishing facility in accordance with National Economic Development goals.

The first possibility would be most indicative of the do-nothing plan. It can be used as a basis for comparison and evaluation with preliminary plans that have been developed.

PLANNING CONSTRAINTS

In the development of alternative plans, certain planning constraints may limit the scope of available solutions. These constraints may consist of physical features of the project area, technological states of the art, economic limitations and legislative restrictions.

There are no planning constraints that can be identified at this stage. There may be possible constraints associated with the physical features of the area and economic limitations. Investigations in future study will better determine if any planning constraints will be encountered.

PLANNING OBJECTIVES

Planning objectives are objectives that help to direct the study to determine how to solve the problems and concerns associated with the existing navigation conditions. These objectives were established by analyzing the range of public and professional concerns expressed about the use of water and land resources of the existing study area. The planning objectives guide planning towards the enhancement of National Economic Development and/or Environmental Quality. The following planning objectives are identified for this study:

- Contribute to the socio-economic development of the East Boat Basin and surrounding Cape Cod area during the 1985-2035 analysis period.

- Contribute to the safety of navigation in the East Boat Basin during the 1985-2035 analysis period.

- Contribute to the expansion of the commercial fishing activities at the East Boat Basin during the 1985-2035 analysis period.

- Contribute to the enhancement of the recreational boating activities at the East Boat Basin during the 1985-2035 analysis period.

These objectives will be used to help formulate and evaluate plans (preliminary or detailed) throughout the various study stages.

FORMULATION OF ALTERNATIVE PRELIMINARY PLANS

This section of the study will examine two possible plans of improvement that can be implemented to address the planning objectives, in light of the planning constraints.

Nonstructural and structural management measures will be discussed as to the feasibility of the various management measures.

The two plans of improvement were developed as a basis for determining economic justification and feasibility of expanding the basin. From these investigations it can be determined if further study is warranted. These plans should not be considered as the only possible solutions to the project needs. More detailed investigation of other alternative plans will be done in any future study.

MANAGEMENT MEASURES

Formulation of alternative plans require that a broad range of management measures be identified in order to address the planning objectives. These measures can be either non-structural or structural.

A nonstructural management measure that can be implemented is one in which the East Boat Basin management maximizes the use of all available water surface area efficiently. This would require much cooperation between basin users (i.e. Town of Sandwich, Coast Guard, Corps of Engineers, commercial fishing vessels). Another nonstructural management measure is the use of other ports to accommodate the increase in commercial fishing and recreational boats. This measure may allow an immediate solution to the existing problem, but would not satisfy the majority of interests. Due to the convenient location and existing facilities, travelling to other ports would not be attractive. In addition, the lack of providing additional facilities would greatly inhibit the potential economic growth of the local area.

The needs, concerns and objectives placed upon the project would greatly limit the effectiveness of the previously addressed nonstructural measures.

A nonstructural measure that may have merit is rack storage of recreational boats. Although rack storage will not meet the needs of the project as a whole, it could be implemented to help meet the recreational boating planning objective.

In light of local plans and objectives, structural measures appear to be most feasible in meeting project needs. The structural measures are somewhat limited due to project constraints, concerns and objectives. These measures would most likely consist of variations of dredging and/or excavation.

PLAN FORMULATION RATIONALE

The discussion of the previous section suggests that the primary effort of study should be towards structural management measures, in order to meet project needs. Therefore the preliminary alternative plans to be investigated in this stage of the study will consist of plans involving dredging and excavation.

Preliminary alternative plans will consist of physically expanding the basin. This appears to be the best way in which project needs can be met. For simplification, the size of the expansion was based roughly on the Tibbetts Engineering Corp. plan done in a study for the Town of Sandwich. A description of this plan can be found in the following section under Plans of Others. The plans developed here will provide for an increase of water surface area of approximately 10 acres.

The expansion will be divided into recreational, commercial, channel and turning basin areas. Information from local interests indicate that recreational slips will be fully utilized immediately. New and larger capacity commercial fishing facilities would attract many new fishing vessels to offload at Sandwich. It is anticipated that the commercial fishing activities will fully utilize the basin within 10 years.

PLANS OF OTHERS

The town of Sandwich had a feasibility study for expansion of the East Boat Basin done for them by Tibbetts Engineering Corporation.

Two plans of improvement were developed by Tibbetts, both of which involve physical expansion of the basin. One is an open basin plan with various commercial fishing and recreational facilities on the surrounding waterfront. The other is a split basin plan where the commercial and recreational areas are physically separated by a central pier or piece of land. The split basin plan is the locals preferred plan.

The Tibbetts Engineering Corp. study examined the total development of the East Boat Basin, including the water area expansion and landward facilities. Both the open basin plan (Plan A) and the split basin plan (Plan B) utilized all slip berthing areas for mooring of boats. The shore stabilization in both plans was composed of steel sheet pile bulkheading. Depths of commercial areas and channels are to be -16 feet MLW and depths in the recreational areas are to be -8 feet MLW. Major line items for Tibbetts' Plan A included $4.5 million for bulk earth removal, $1.4 million for docks and piers and $2.3 million for bulkheads. Major line items for Tibbetts' Plan B included $4.3 million for bulk earth removal, $1.6 million for docks, $3.5 million for bulkheading and $1.1 million for tie back system. The total cost estimates for both plans were $16,600,000 and $18,200,000 respectively.

Benefits calculated by the Tibbetts study resulted in increased fish landing benefits of $7,739,500 and increased benefit to recreational boaters of $412,500 annually, yielding total annual benefits of $7,739,500. This results in a benefit/cost ratio of 5.6 when the annual benefits are compared with the first cost amortized over a project life of 50 years.

unclear

The Tibbetts report indicates that Federal (Corps of Engineers) funding can range from 50% to 100%. The report does not investigate the areas of participation that legislative directives do not allow. Therefore the report is somewhat misleading in presenting the potential Federal funding available. The Tibbetts report contains cost estimates for the overall development which are much higher than just the anchorage expansion, leading to the belief that the Federal contribution could be up to at least 50% of $18,200,000. The Federal contribution percentage can only be applied to the anchorage expansion, not the landward facilities, docks and bulkheading, etc. Most likely Federal funding will be much less than anticipated by local interests when compared to the Tibbetts study figures.

DESCRIPTION OF PLANS

The plans that were developed for this reconnaissance were preliminary. They do not contain a specific mooring arrangement which can be shown on a drawing. The area of expansion was based roughly on the Tibbetts study. Cost estimates were based on rough quantities and boat projections were based on rough boat/acre figures for slip berthing and open mooring, which were obtained from sources experienced in these areas. It was felt that this was sufficient detail to determine feasibility and determination of warranting further study.

The plans developed here are compatible with those in the Tibbetts study, except that somewhat less land for shore facilities may be available due to additional space requirements of a riprap shore. The unloading distance to the facilities will increase when docks are extended out over the riprap slope till adequate depths are reached. The use of a riprap slope however, allows maximum Federal participation in a project.

Fishing vessels continue to be built increasingly larger. It is anticipated that 100' long fishing vessels will have to be accommodated. A depth of at least -15 feet MLW is required, which will be used as the design depth for commercial areas. Recreational depth will remain the same as the existing basins recreation elevation of -8 feet MLW.

The following alternative preliminary plans are based on an open basin plan. Open basin means that there is no physical separation between the commercial and recreational anchorage areas. The banks of the basin are riprapped along the whole shoreline. These plans involve dredging sections of the existing basin and excavating existing topography for expansion. The amount of dredged material to be removed from the existing basin is about 4% of the total project material to be removed, and the bulk of the project material to be removed consists of excavated material which is about 96% of the total. For planning and explanation purposes, the basin has been divided into six sections. See Figure 4. Sections A, B and C are existing basin sections and Sections D and E are the approximate sections of basin expansion. The channel and turning basin are indicated by the shaded area.

The alternative preliminary plans are as follows:

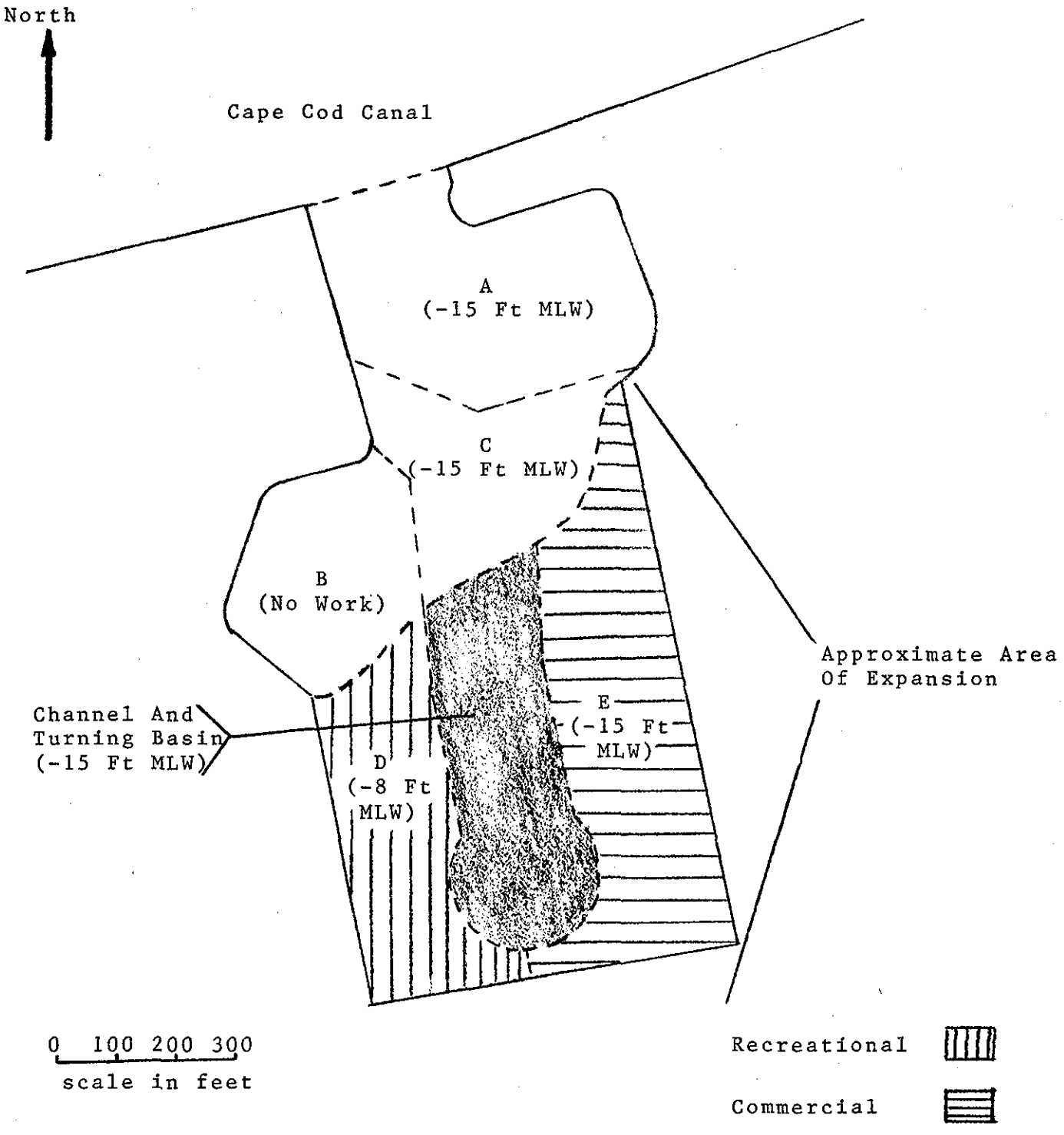
Plan A - Deepen Sections A and C from their present depths to -15 feet MLW. Excavate the commercial area, channel and turning areas from the elevation of the existing topography to -15 feet MLW. The recreational area is to be excavated in the same manner as the previously mentioned areas, except that the bottom elevation will be -8 feet MLW. The total expansion will increase approximately 10 acres, of which 3 acres are recreational, 3 acres are channel and turning basin and 4 acres are commercial. The anchorage areas for both commercial and recreational areas are open mooring. This means boats are anchored on lines in open water necessitating transfer vessels to move people from shore to the boat and vice versa. Figure 5 illustrates the Plan A configuration.

Plan B - The same dredging and excavation work is required as in Plan A. The boat anchoring scheme is the only difference. The anchoring scheme will be slip berthing, meaning a system of docks is used to anchor boats. This scheme allows direct boarding of boats. An illustration showing a possible slip berthing scheme is shown in Figure 6.

ASSESSMENT AND EVALUATION OF PRELIMINARY PLANS

This section of the study will assess and evaluate the preliminary alternatives that have been developed. Included in the evaluations will be discussions of project benefits, project costs and economic justification.

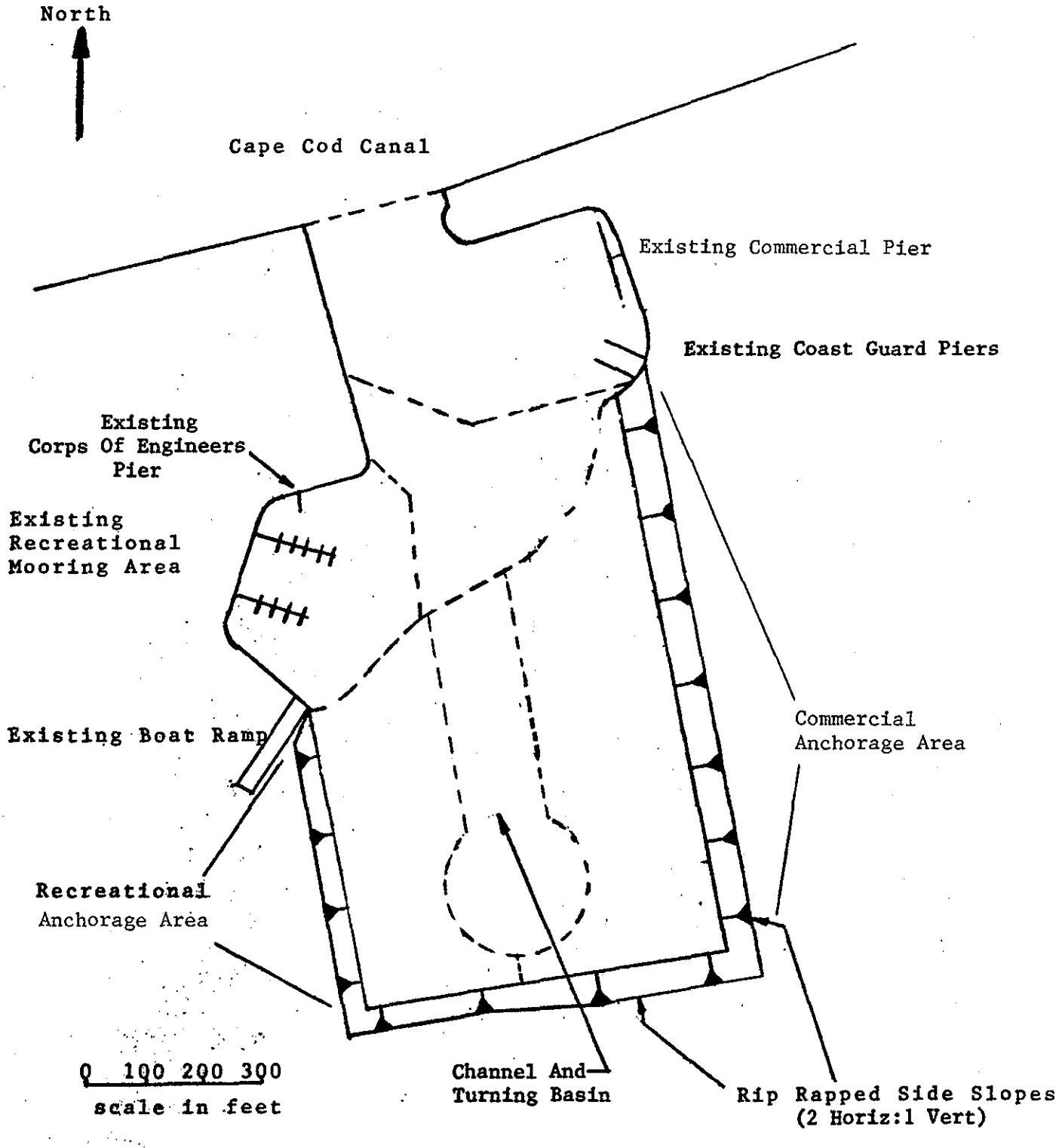
The different mooring schemes and how they affect the cost proportionment between local interests and the Federal government will be addressed.



EAST BOAT BASIN

ILLUSTRATION OF PROPOSED EXPANSION

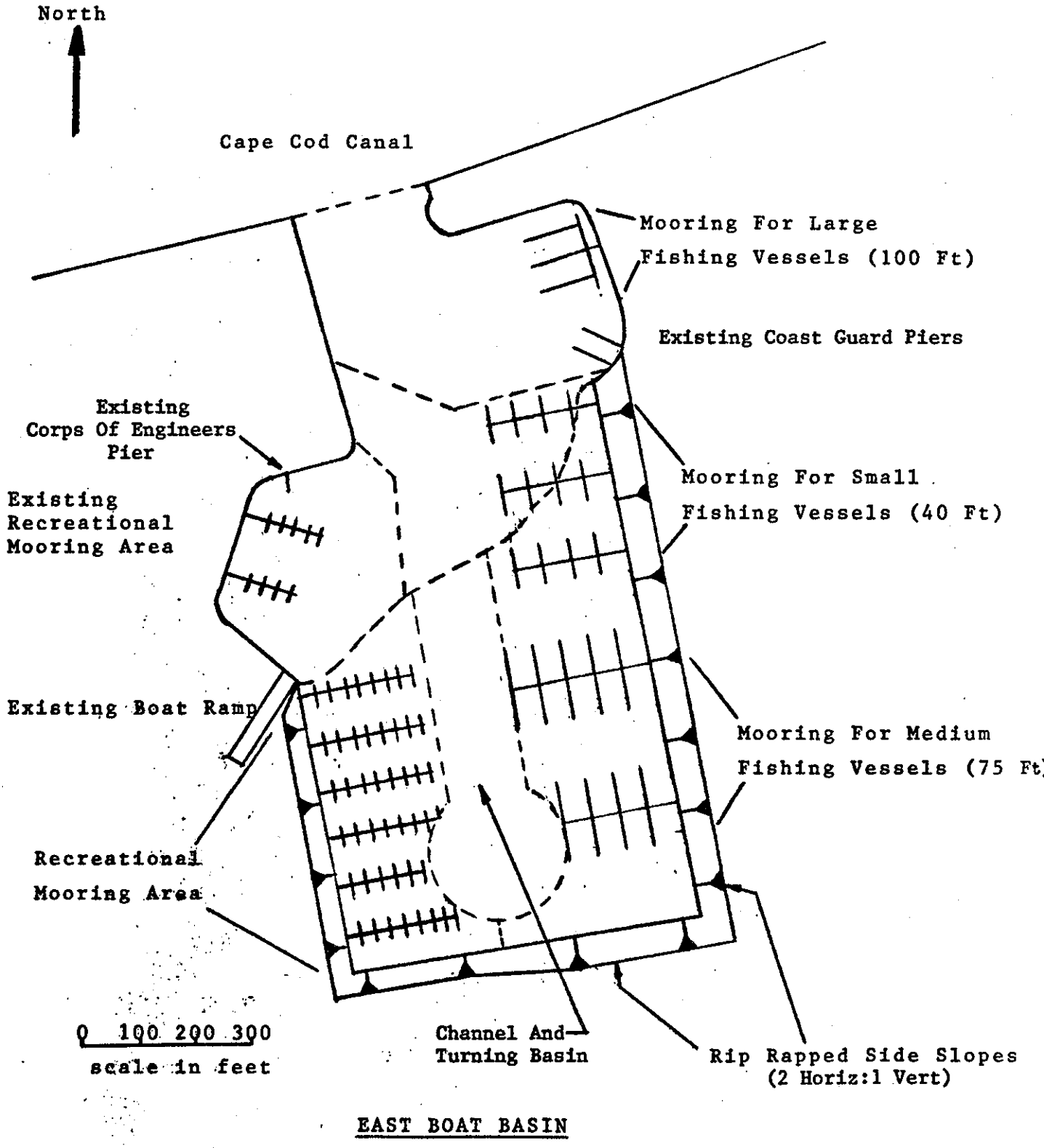
FIGURE 4



EAST BOAT BASIN

PLAN A - OPEN MOORING FOR BOTH RECREATIONAL AND COMMERCIAL

Figure 5



EAST BOAT BASIN

PLAN B - SLIP BERTHING FOR BOTH RECREATIONAL AND COMMERCIAL

Figure 6

There will be socioeconomic and environmental impacts as a result of a project at the East Boat Basin. These will be discussed as to how they may affect the surrounding area during and after construction.

SOCIOECONOMIC IMPACTS

Project Purpose

Presently, operating conditions in the basin can be extremely crowded during the summer months when an influx of recreational boats seek berthing in the basin area. Commercial fishermen are now forced to wait to dock and/or unload their fish or go elsewhere. Commercial fishing is supported by residents of Sandwich because of its compatibility with tourism, the town's biggest industry. In the future, if the basin remains in its present condition, tourism and commercial activity would not increase around the basin area. Sandwich would be forfeiting additional gains that would accumulate with these landings. As a section of the Massachusetts Coastal Zone Management Plan which deals with Cape Cod states "Commercial fishing provides economic benefits to fishermen, restaurants and market owners, boat repair yards, and other support services. The commercial fishing industry is compatible with the traditional character of the area and also lends support to tourism which is so vital to the economy of the region." Therefore, the problem centers around economic loss to the town of Sandwich as well as the region if fishermen go elsewhere. In general, in its present situation, one would not expect any significant commercial, industrial, or residential growth in the area around the basin. The potential for a thriving commercial area would be lost to other coastal towns.

The purpose of a project at East Boat Basin is to improve conditions for commercial and recreational fishing and to provide the opportunity for expansion of marine related industry. The local plan for the expansion of the basin is being formulated to provide an increase in the berthing capacity. In addition, land surrounding the basin would be available for marine related industry. Other considerations that would be accounted for in this plan would be access roads, water utilities, and an adequate sewerage system. The plan includes 22 acres of land, 10 of which might be dredged out behind the existing basin. With the implementation of this proposal, commercial fishermen would be able to dock at East Boat Basin, reducing the overcrowded conditions. Fishermen would also now be able to stop at the basin to refuel, offload their fish, etc. At the same time, the area alloted to recreational boats would be slightly enlarged, allowing for more efficient docking of these types of boats.

The implications of this expansion project are important and consequently this plan with Federal involvement must be evaluated as to its effects on national economic development, environmental quality, social well-being and regional development. This section is specifically devoted to the social well-being concerns of widening the basin; the impacts which concern the individual, community, and region as well as the

nation. Development of water and land resources can have both beneficial and adverse impacts on the social well-being. The implementation of the expansion project at East Boat Basin in Sandwich, Massachusetts would have both short and long term effects which could have site specific or regional implications.

The following material provides a general discussion of potential impacts that could result from implementation of a project. As this study progresses further evaluation of these impacts will occur. A more detailed assessment of effects on health, safety, community well-being, effects on educational, cultural, and recreational opportunities, effects on community growth or destruction of community cohesion will be needed to assure that the project satisfies local needs and desires and is responsive to social well-being concerns.

The impact discussion for this stage of study has been broken down into two phases, short-term (construction) and long term (post construction) impacts. However, before discussing these impacts, it is pertinent to note that public meetings which have been held have indicated the support of the fishermen, fish dealers, and residents in Sandwich for the basin expansion.

Construction

The short term impacts are generally site specific and would occur during the construction phase. The magnitude of each impact experienced during this phase depends on the length and season of the construction period, the number of workers required and types of construction material and equipment utilized. Construction would entail excavation for expansion of the basin, dredging in the existing portion of the basin and site preparation, and construction of accessible piers, roadways, and parking lots within the basin area. The construction impacts of dredging would include an increase in noise and dust levels for boat users as well as residents living relatively close to the basin. The transport of materials and equipment by land would increase the use of residential roads by heavy truck traffic. Furthermore, it is clear that the dredging equipment would interfere with the boating traffic. Consequently, this process would disrupt the normal proceedings at the basin. Since the whole process is estimated to take about two years, some inconvenience of usual activities is expected to occur during at least one peak season. Problems involving access to both sides of the basin should be minimal. However getting from one side of the basin to the other will require a longer route. The expansion will eliminate the road between the proposed expansion and existing basin. Some type of intermediate crossing may be incorporated in the alternative plans, but that is only speculation at this stage.

Post Construction Impacts

The major direct long term effect of the project would be an increase in space for commercial boats. An indirect impact caused by this effect would be financial benefits to the town as well as the region. With more space available, commercial fishermen would then be able to refuel, re-supply and sell their fish at the basin instead of moving on to other docking areas. This effort would in turn boost the profits of surrounding businesses. Development of new businesses due to the increased commercial activities is expected to result in an increase in the tax base for Sandwich. Consequently, the long term effects can be seen as a chain reaction, one positive impact supporting the next and subsequently aiding the town and county.

Adverse long term impacts are also expected to develop: use of the basin by a greater number of commercial boats will inevitably cause an increase in fuel entering the water, increase noise levels and boat traffic.

As stated previously the marine expansion property includes 22 acres of land; however, only approximately 10 acres would be excavated leaving the remaining acres available for a food processing plant, fish market, restaurants and motels. Commercial buildup would accumulate over the years with a majority of growth in the first years of implementation. Most importantly, more fishermen would now be able to sell and process their fish at the basin. As a consequence, this type of development would attract tourism and help boost the local economy.

ENVIRONMENTAL IMPACTS

General

Construction-related impacts as well as those pertaining to existence and operation of the improved East Boat Basin can be expected. These will be of both a short and long-term nature. Impacts will occur at both the site of the project and its environs and at disposal locations for the excavated and dredged materials, as well as along transportation routes to the disposal locations.

Aquatic Ecosystem

Short-term impacts of the dredging will include physical destruction of benthic habitats and organisms as well as those due to settling of sediments and temporarily increased turbidity in the Basin. The primary chemical effect at the dredge site will be associated with the disturbance and subsequent exposure of anaerobic bottom sediments, leading to some depletion of dissolved oxygen in these waters. Hydrogen sulfide gas may also be liberated during dredging, possibly resulting in unpleasant odors. No significant long-term effects are anticipated. Recolonization of the Basin should take place after the cessation of the dredging operations. A secondary effect of the dredging (and expansion) of the Basin may take place, however, due to the increased use of the upgraded facility. More boats will lead to increased pollution within the cul-de-sac configuration of the Basin. The degree to which this will occur and the extent to which tidal flushing would ameliorate the increase will be considered at the next stage of study.

Impacts of the disposal of the dredged material will depend on the nature of the material, to be evaluated in detail at a later date, and the characteristics of the selected disposal site. Open-water disposal is likely, but a specific disposal site has not yet been selected.

Terrestrial Ecosystem

Expansion of the Boat Basin should have minimal effect on local and regional terrestrial ecological resources. The site is primarily fill with no apparent significant wildlife habitat or value. The small wet area at the center of the site containing wetland grasses is not of any apparent significance, however coordination with appropriate agencies will take place concerning this feature as the study develops.

If the basin is expanded shoreline will reach further inland into areas that are less affected by salt water at present. The extent and possible effects of salt water intrusion may have an impact on the surrounding area. These will have to be investigated as study progresses.

Impacts normally associated with construction will cause some temporary increase in noise and dust immediately around the project site. Impacts of the disposal of excavated material will depend on the site(s) selected for disposal and the associated transportation routes. Increased noise from truck traffic along the transportation routes would be expected. Operation of the deepened and expanded Boat Basin would not be expected to lead to any significant effects on the terrestrial environment.

Threatened and Endangered Species

No threatened or endangered species of plants or animals are known to inhabit the waters of the current East Boat Basin or the area of the proposed East Boat Basin expansion.

Recreation and Natural Resources

It is not expected that expansion of the East Boat Basin will have any significant effect on the use of the Corps of Engineers's recreational area, unless the three fish packing companies presently leasing space on the bulkhead from the Corps of Engineers are relocated to the expanded Basin. If they are relocated and their present leases terminated, as previously recommended in the Corps of Engineers' Cape Cod Canal Master Plan, then more land would be made available along the bulkhead for sport fishing and expansion of the picnic area.

Historic and Archaelogical Resources

The area of proposed expansion is composed largely of fill from construction of the existing Boat Basin and the nearby power plant. Therefore, historic and archaelogical resources are highly unlikely in this location. Disposal strategy for the material from the proposed project, both excavated and dredged, has not been determined as yet. Examination of disposal sites may be necessary to determine potential effects upon any historic or archaelogical resources present.

ANALYSIS OF CONSIDERED PLANS

Plan A - Implementation of Plan A would increase the water area by approximately 10 acres. Three acres would be for recreation, 4 acres for commercial use and 3 acres for channel and turning areas. Areas D and E indicate the rough division between the recreational and commercial areas to be excavated. The existing and expanded recreation areas will be kept together, and the commercial areas will be consolidated.

Commercial fishing vessels up to 100 feet long would be able to off load. The commercial and recreational fleets would be able to expand.

Plan B - Implementation of Plan B would have the same results as Plan A. Plan B would allow more boats to anchor due to the increased efficiency of slip berthing.

ECONOMIC ANALYSIS

In order to determine if the preliminary alternative plans are economically feasible, the economics associated with the plans should be analyzed.

This evaluation consists of examining the equivalent average annual charges and the average annual benefits attributed to the project, over a 50 year project life. Values given to costs and benefits at the time of accrual, are converted to an equivalent time basis. The discount rate now applicable to Federal projects is .0759, which corresponds to a 7.375 percent annual interest rate. Annual charges for maintenance are also determined.

Public access and shore facilities are self-liquidating, and are not included in the project cost estimates.

PROJECT BENEFITS

Benefits which are to be derived from the expansion of the East Boat Basin are primarily due to projected increases of fish landings. Recreational boating activity will contribute some, but not a substantial amount of benefits. These benefits are converted to average annual amounts, which can then be compared with the average annual costs to determine economic justification.

The present fleets at the East Boat Basin are estimated to be 40 commercial fishing boats and 112 recreational boats.

Plan A projections indicate an increase of 60 commercial boats and zero recreational boats. There is no increase in recreational craft because approximately 20 existing boats must be removed because of the expansion. With an open mooring plan the new area can only allow space for the same 20 boats. This results in no net increase of recreational boats.

Plan B projections are based on use of the more efficient slip berthing. Resultant projections are increases of 94 commercial boats and 76 recreational boats.

The dollar values for commercial fishing benefits were based on projected increases of fish landings and the dollar values of recreational benefits were based on the net return of the depreciated value of recreational boats as if they had been used on a for hire basis. The slip berthing anchoring scheme allowed substantially more benefit, for both recreational and commercial, than did open mooring.

Detailed benefit analysis can be found in Appendix 1. A summary of these benefits are in Table 11 below.

Table 11

Average Annual Benefits of Alternative Plans

	Plan A	Plan B
Commercial Fishing Benefit	$2,320,000	$3,329,000
Recreational Boating Benefit	0	$ 204,000
Total Benefit	$2,320,000	$3,533,000

PROJECT COSTS AND PROPORTIONMENT

Estimated costs of the preliminary plans include dredging of channels, turning basins and anchorage areas; excavation of channels, turning basins and anchorage areas; tranportation of dredged and excavated materials to designated disposal sites; riprap; and labor and equipment necessary to construct the project.

Quantity estimates are based on existing conditons and July 1980 prices. Detailed topographic, subsurface and hydrographic surveys will be performed if further study warrants them.

The first costs of these alternative plans are to be proportioned between the Federal government and local interests according to the type of mooring scheme. The type of mooring scheme determines how much Federal participation may be allowed. Both plans include dredging of areas in the existing basin, which is a Federal responsibility. Plan A, which is open basin with all open mooring, includes the whole expansion area as the Federal project. In this plan the commercial area excavation, dredging and riprap would be 100 percent Federal. The recreational excavation, dredging and riprap would be equally shared by Federal and local interests. Plan B, which has all slip berthing, would only include a channel and turning basin as the Federal project. This is because planning regulations negate Federal participation in slip berthing projects. Therefore the channel and turning basin would be Federal responsibility and the remaining excavation, dredging and shore stabilization to be assumed by local interests. The proportionment of first costs is based on the above cost sharing analysis.

Rough estimates of annual maintenance charges for dredging, riprap and aids to navigation have been made. Maintenance for Plan A would be totally Federal, and maintenance for Plan B would be totally Federal for the channel and turning basin. The remaining areas of Plan B are local maintenance responsibilities.

Appendix 1 contains preliminary quantity estimates, cost estimates, maintenance charges, and first cost and annual charges applicable to Federal and local interests. These have been summarized in Tables 12, 13 and 14.

Table 12

Summary of Total First Costs and Average Annual Charges

Plan	Total First Cost	I&A Rate	Annual Charge	Annual Maintenance Charge	Total Annual Charge
A	$4,460,000	.0759	$339,000	$45,030	$384,000
B	$4,460,000	.0759	$339,000	$45,030	$384,000

Table 13

Summary of Total First Cost Proportionment

Plan	Federal	Local
A (Open-mooring)	$3,925,000	$535,000
B (Slip-berthing)	$1,538,000	$2,922,000

Table 14

Proportioned First Costs and Corresponding Annual Charges

Plan		First Cost	I&A Rate	Annual Charge	Annual Maintenance Charge	Total Annual Charges
A	Federal	$3,925,000	.0759	$298,000	$45,030	$343,000
	Local	$ 535,000	.0759	$ 41,000	0	$ 41,000
B	Federal	$1,538,000	.0759	$117,000	$22,700	$140,000
	Local	$2,922,000	.0759	$222,000	$22,330	$244,000

ECONOMIC JUSTIFICATION EVALUATION

When determining if proposed Federal projects are economically justified, a comparison of annual benefits and annual charges is made. Only items to which monetary value can be attached are evaluated. Other subjective evaluations play an important part in the study also. A benefit/cost ratio is used for economic justification. This value is derived by division of the average annual benefits by the average annual charges. A B/C ratio greater than 1 indicates that more benefits are derived, than the cost to derive them. This indicates economic justification. A B/C ratio less than 1 indicates a lack of economic justification.

The economic justification of the alternative preliminary plans is summarized in Table 15 below.

Table 15

Summary of Economic Analysis

Plan	Description	Annual Benefits	Annual Charges	B/C Ratio
A	Open Mooring	$2,320,000	$384,000	6.0
B	Slip Berthing	$3,533,000	$384,000	9.2

Both Plans A and B show a B/C ratio greater than 1 for the Federal project. This economic justification is only legitimate if the East Boat Basin expansion develops as proposed by local interests. There must be a substantial increase in fish catch and/or recreational activity, such that the B/C ratio is at least 1 or more in order to have a viable Federal project. This would require a combined increase (recreational and commercial) of average annual benefits of at least $382,000.

In comparing the above results with the Tibbetts study, the B/C ratios would seem to be relatively close. Tibbetts' B/C ratio is 5.6 as compared to 6.1 and 9.2 for this reconnaissance. They are different though, because they are based on different items. The Tibbetts report projects approximately 3.3 and 2.2 times as much benefit as this reconnaissance, but their project cost is based on total facilities (water and land) whereas the Federal project is based on an anchorage area project only, resulting in a much lower project cost.

ITEMS OF FEDERAL RESPONSIBILITY

The items of responsibility for the Federal Government for participation in a Federal project are as follows:

- Provide a cash contribution of 100 percent of construction costs of a Federal project, for the development of commercial activities. The commercial area must have access and be open for use by all on equal terms.

- Provide a cash contribution of 50 percent of construction costs of a Federal project, which enhances recreational activities.

- Federal projects enhancing commercial or recreational activities, will have the associated annual maintenance done or paid for by the Federal Government.

ITEMS OF LOCAL RESPONSIBILITY

In order to construct any proposed Federal project, necessary local sponsorship must be obtained. Local interests must determine if these assurances can be met:

- Provide a cash contribution toward construction costs, determined in accordance with existing policies for regularly authorized projects. For recreational small-boat projects a 50 percent first cost contribution is required.

- Provide, maintain and operate without cost to the United States, an adequate public landing with provisions for the sale of motor fuel, lubricants and potable water open and available to the use of all on equal terms.

- Provide without cost to the United States all necessary lands, easements and rights-of-way required for construction and subsequent maintenance of the project including suitable dredged material disposal areas with necessary retaining dikes, bulkheads and embankments therefor.

- Hold and save the United States free from damages that may result from construction and maintenance of the project.

- Accomplish without cost to the United States alterations and relocations as required in sewer, water supply, drainage and other utility facilities.

- Provide and maintain berths, floats, piers and similar marina and mooring facilities as needed for transient and local vessels as well as necessary access roads, parking areas and other needed public use shore facilities open and available to all on equal terms. Only minimum, basic facilities and service are required as part of the project. Any facilities or service provided over the required minimum is a local decision, and financing of such facilities and services is a local responsibility.

- Establish regulations prohibiting the discharge of untreated sewage, garbage, and other pollutants in the waters of the harbor users thereof, which regulations shall be in accordance with applicable laws or regulations of Federal, State and local authorities responsible for pollution prevention and control.

RECOMMENDATIONS AND CONCLUSIONS

FURTHER STUDY

The economic analysis of the preliminary alternative plans shows economic justification for expansion of the East Boat Basin, subject to development of the basin by local interests. Therefore planning will proceed from Stage I to Stage II of the planning process. Study will continue in accordance with the regulations and guidelines, required by Congress, the Corps of Engineers and the Water Resources Council's Principals and Standards. Stage II will place emphasis on the formulation of alternative plans, as well as identifying any problems that were missed. See Figure 2. The time frame for continuation of study will be dependent upon funding and in-house requirements. Coordination with previously contacted governmental agencies and local interests will be maintained. Meetings with local officials and interests will be required to discuss the Stage I document and obtain local input into the initiation of Stage II studies. Figure 7 shows a rough planning schedule.

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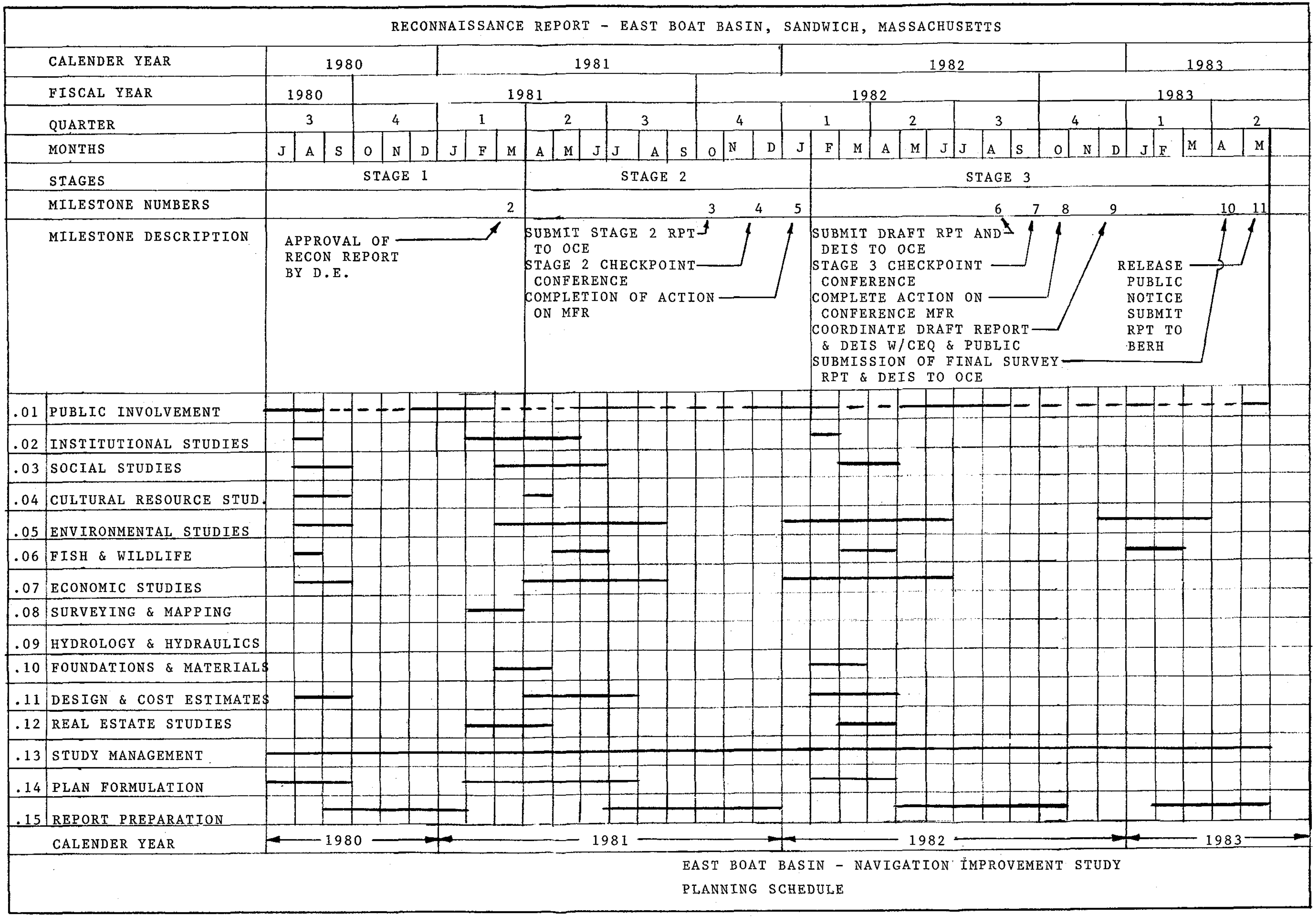

Figure 7

ITEMS FOR FURTHER STUDY

Although this Reconnaissance Report indicates a project that is economically feasible, it is a preliminary assessment. More detailed study is required to make a positive determination for project feasibility. Following are items that need further study:

- Identification of any problems and needs not previously identified.

- Availability of surrounding land. The optimum size of the expansion may require more land than that which is presently available. This has to be investigated to determine if this will be a planning constraint.

- Perform detailed engineering surveys, investigations and analyses to identify existing conditions, assist in plan formulation and develop quantity and cost estimates.

- More detailed socio-economic base studies, to determine impacts on the Sandwich area socio-economic characteristics.

- Method of disposal of excavated and dredged materials, and identifying disposal sites.

- Perform detailed environmental studies to fully determine impacts.

- Formulation of alternative plans, to include all practical structural and nonstructural management measures.

- Coordinate with land based plans of basin development in order to better determine benefits associated with each plan.

CONCLUSIONS

The problems and needs expressed by local interests were investigated. Basically one plan with two variations was presented, and was found to be worthy of further study and analysis.

The two variations studied involved two types of mooring systems, open mooring and slip berthing. It can be concluded that the open mooring system for recreational boats would not be very effective at the East Boat Basin. At least three acres is needed just to allow mooring for the displaced recreational boats. Excavation of large amounts of material for a few boats is not very cost-effective. Slip berthing is a much more effective method of placing more boats in less space. It would appear logical to pursue a plan that includes slip berthing and other more effective methods of recreational boat storage.

ACKNOWLEDGEMENT AND IDENTIFICATION OF PERSONNEL

1. This report was prepared under the supervision of the following New England Division personnel:

Colonel William E. Hodgson, Jr., Acting Division Engineer
Colonel Max B. Scheider, Division Engineer
Joseph L. Ignazio, Chief, Planning Division
Donald W. Martin, Chief, Coastal Development Branch

2. The following team members and other members of the New England Division contributed to the study:

Mr. Dirk Zwart, Civil Engineer - study management
Mr. James Abcouwer, Civil Engineer - study management
Mr. Larry Dolinsky, Economist - economic data and benefit forecast
Ms. Diana Platt, Geographer - local economic and sociological conditions
Mr. Joseph Horowitz, Physical Scientist - environmental considerations
Mr. Anthony Mancini, Civil Engineer - engineering design
Ms. Laraine Bogosian - word processing
Ms. Maureen Cummings - administrative assistance
Reprographics Section - graphics and reproduction

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Mr. Eugene Carr - Sandwich Selectman
Mr. E.T. Moffitt - Sandwich Harbormaster
Mr. Edwin Robinson - U.S. Fish and Wildlife Service
Mr. Louis Roberti - Sandwich Selectman

SANDWICH, MASSACHUSETTS
RECONNAISSANCE REPORT FOR NAVIGATION IMPROVEMENTS
EAST BOAT BASIN, CAPE COD CANAL

APPENDIX 1

TECHNICAL REPORT

SECTION A - ENGINEERING INVESTIGATIONS

SECTION B - ECONOMICS

Prepared by the

New England Division, Corps of Engineers
Department of the Army

SECTION A

ENGINEERING INVESTIGATIONS

ENGINEERING INVESTIGATIONS

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ENGINEERING COST ESTIMATES

The cost estimates for expansion of the East Boat Basin were based on preliminary quantity estimates of the dredging, excavation and riprap portions of an expansion project. These items represent the bulk of Federal responsibility in a Federal expansion project. Landward facilities are not a Federal responsibility, and therefore are not included in the cost estimates for the actual expansion. Landward facilities and local desires, will be coordinated with during the development of alternative plans in Stage II. This will allow incorporation of Federal participation into the development of an overall project at the East Boat Basin.

The plans developed were not specific plans per se, but were developed to provide preliminary cost estimates to determine economic feasibility and to determine if further study is warranted. The plans were developed based roughly on the Town of Sandwich (Tibbetts Engineering Corp.) plan. From this thinking, a total expansion area of 10 acres, with a breakdown of areas for commercial, recreational and channel and turning basin, was used. The depth of -15 feet MLW was used, versus -16 feet MLW used by Tibbetts, for commercial areas. The recreational depth of -8 feet MLW was retained for the reconnaissance stage plans.

The existing East Boat Basin and the proposed expansion area have been divided into 6 sections for planning purposes. See Figure 4 in the main report. Sections A, B and C are existing basin sections and sections D, E and the channel and turning area are expansion area sections. The excavation, dredging and riprap are the same for both Plans A and B, the mooring scheme is the only difference. Both plans require a channel and turning basin that is of sufficient depth to accommodate both commercial and recreational craft.

SURFACE AREA OF THE BASIN

In order to determine rough dredging and excavation quantities, the approximate surface areas of the work sections must be known. These have been determined by examining existing topographic maps and project maps of the East Boat Basin. For Plans A and B the various expansion areas are 4 acres for commercial activities, 3 acres for recreational activities and 3 acres for channel and turning basin. The dredging and excavation surface areas of the various sections are listed as follows.

Section Designation	Work To Be Done	Present Elevation (ft. MLW)	Surface Area (s.f.)
A	Dredge to -15' MLW	-13	117,610
B*	None	-8	87,120
C	Dredge to -15' MLW	-8	100,190
Commercial	Excavate to -15' MLW	+21 (ave.)	174,240
Recreational	Excavate to -8' MLW	+21 (ave.)	130,680
Channel and Turning Basin	Excavate to -15'MLW	+21 (ave.)	130,680

*Section B requires no work and will not be a project cost.

DREDGED AND EXCAVATED QUANTITIES

Dredging quantities and excavation quantities will be the same for both Plans A and B. The depths of cuts have been determined by examining existing topographic and project maps of the East Boat Basin. Quantities can then be estimated knowing the surface area and depth of cut. Determination of rough quantity estimates are summarized below.

Work	Surface Area (s.f.)	Cut (ft.)	Quantity (c.y.)
Dredge A	117,610	2	8,710
Dredge C	100,190	7	25,980
Excavate Commercial	174,240	36	232,320
Excavate Recreational	130,680	29	140,360
Excavate Channel and Turning Basin	130,680	36	174,240

DREDGING AND EXCAVATION COSTS

Cost estimates for dredging and excavation have been determined by using July 1980 cost quotes. These are $9/c.y. for dredging and $5/c.y. for excavation. Cost estimates for each section of work are listed below.

Section	Work	Quantity	Cost
A	Dredge	8,710	$78,000
C	Dredge	25,980	$234,000
Commercial	Excavate	232,320	$1,162,000
Recreational	Excavate	140,360	$702,000
Channel and Turning Basin	Excavate	174,240	$871,000

RIPRAP COST ESTIMATES

Rough estimates for cost of riprap have been determined using July 1980 price quotes. The elevation of finished grade of the land immediately surrounding the expansion has been assumed to be approximately +13 feet MLW. The riprap cost estimates for the expansion sections have been determined below.

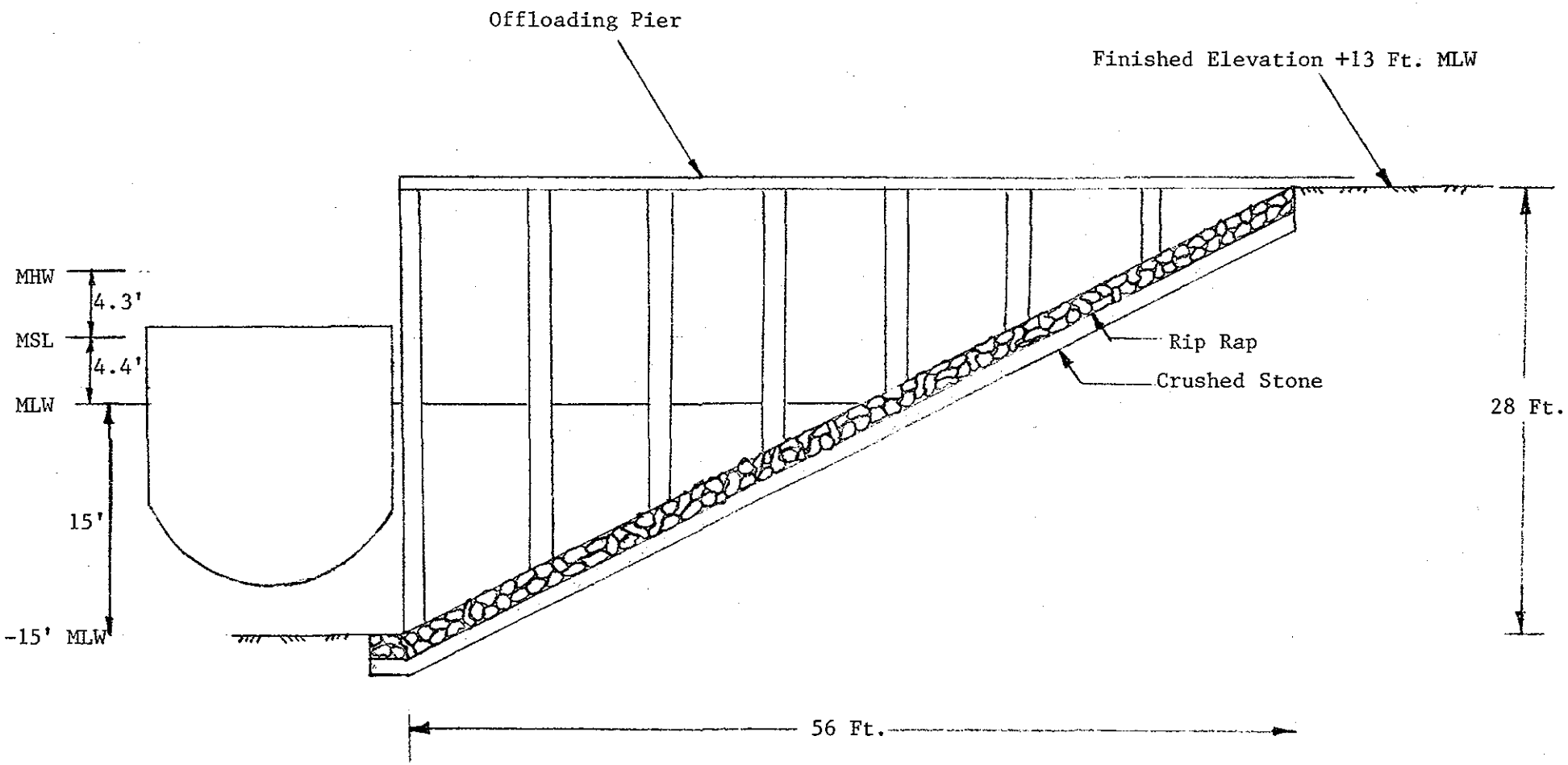
Area D

- Riprap slope is 1 vertical to 2 horizontal.
- Slope extends from -8 feet MLW to +13 feet MLW.
- Length of slope equals 49 feet (including additional depth necessary to stabilize toe of slope).
- Area D has 800 lineal feet of shoreline.
- Area of riprap equals 39,200 square feet.
- Cost of riprap: filter fabric, 1 foot of crushed stone and 1.5 feet of riprap equals $3.10 per square foot.
- Total riprap cost for Area D equals $122,000.

Area E

- Same type riprap slope as Area D.
- Slope extends from -15 feet MLW to +13 feet MLW.
- Length of slope equals 65 feet (including additional depth necessary to stabilize toe of slope).
- Area E has 1,300 lineal feet of shoreline.
- Area of riprap equals 84,500 square feet.
- Cost of riprap equals $3.10 per square foot.
- Total riprap cost for Area E equals $262,000.

RIP RAP CROSS-SECTION - Commercial Fishing Area Shown



SECTION B

ECONOMICS

ECONOMICS

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BENEFITS AND COSTS

PROJECT BENEFITS

1. Project Description

The East Boat Basin of the Cape Cod Canal is the only deepwater harbor in Sandwich. Old Harbor at Sandwich Glass Works is too small and shoal for any kind of commercial activity except for a small skiff operation. The East Boat Basin currently serves multiple functions. It was originally established as a harbor of refuge by the Corps of Engineers and includes a Town-owned marina for recreational craft, a public launch ramp, berthing for a very limited number of commercial fishing vessels, and berthing for the U.S. Coast Guard and Corps of Engineers' vessels. The land areas adjacent to the harbor are heavily commercialized and are zoned for industry and marine use. On each side of the entrance to the basin are bulkheads owned and maintained by the U.S. Army Corps of Engineers. Fish off-loading areas exist outside of the harbor in the Cape Cod Canal along the Corps of Engineers' bulkhead. Several fish dealers are located on the canal; some of these dealers lease their property from the Corps. The Corps also maintains a recreation area on the north side of the entrance. The area includes an 82-car parking area, a picnic area, and a comfort station.

2. Benefits - General

Benefits associated with navigation studies are determined and discussed relative to the value of transportation service, increased safety, reduction of hazzards to vessels and damage to wharves, commercial fishing, recreational boating, land enhancement due to deposition of dredged material, and benefits such as flood control, bank stabilization, shore protection and others which may result from considered projects. The evaluation is performed with an accuracy and precision consistent with the basic data and appropriate to each stage of the study.

Of the above mentioned benefits the ones associated with fishing, and recreational boating are of relevance to the proposed expansion of the East Boat Basin at Sandwich. The following paragraphs contain a discussion of these benefits. Where possible, estimates have been provided by knowledgeable local sources. In some areas, however, we have used our own best estimates because local officials were unable to provide adequate data.

3. Commercial Fishing

According to the Cape Cod Planning and Economic Development Commission (1), the East Boat Basin is the second largest port on Cape Cod in terms, of catch. Only Provincetown exceeds Sandwich in pounds of fish landed and dollar values of the catch. In Massachusetts, Sandwich

currently ranks fifth, below the ports of Gloucester, New Bedford, Boston, and Provincetown. As shown in Table 1, Sandwiches' 1977 catch was 15.3 million pounds which was valued at $5 million.

Table 1

Fish Catch, Massachusetts Ports, 1977*

Port	Catch in Million Pounds	Value Millions of Dollars
Gloucester	150.9	$21.5
New Bedford	75.5	$43.2
Boston	22.2	$ 6.0
Provincetown	17.9	$ 6.9
Sandwich	15.3	$ 5.0

*Source: Fisheries of the United States, 1977, U.S. Department of Commerce, National Oceanographic and Atmospheric Administration, National Marine Fisheries Service, April 1978.

During the four year period 1975-1978, the fishing industry in Sandwich has shown significant growth. The number of fishing trips has doubled, the catch has tripled, and the value of the catch quadrupled. Table 2 shows the pounds and dollar value of fish landed at Sandwich from 1975 to 1978. The increase in the value of the catch partly reflects the rise in the price of finfish over these years.

Table 2

Reported Fish Landings, 1975-1978*
East Boat Basin, Sandwich

Year	Number of Trips	Number of Pounds	Increase Over Previous Year	Ex-Vessel Value	Increase Over Previous Year
1975	962	6,383,000	--	$1,573,000	--
1976	1,724	11,845,000	5,462,000 lbs. 86%	4,359,000	$2,606,000 149%
1977	1,886	15,340,000	3,495,000 lbs. 30%	5,045,000	686,000 16%
1978	1,828	19,021,000	3,681,000 lbs. 24%	7,778,000	2,733,000 54%

NOTE: Increase in pounds - 1975-1978 - 198%
Increase in dollar value - 1975-1978 - 344%

Source: Commonwealth of Massachusetts Division of Marine Fisheries, Sandwich.

Without Project Condition

Table 3 shows that in 1977 the Sandwich based fishing fleet accounted for about 25 percent of the total catch landed at Sandwich.

Table 3

Total Reported Fish Landings at Sandwich, 1977*
Sandwich and Non-Sandwich Boats

Home Port	Pounds Landed at Sandwich	Value
Sandwich	3,368,143	$1,558,495
Other	12,238,620	3,926,973
Total	15,606,763	$5,485,468

*Source: An Economic Profile of the Cape and the Island Fisheries, Cape Cod Planning and Economic Development Commission, 1978.

A proration of the data presented in Table 3 must be made in order to determine the average number of landings per boat and the average catch per landing. The calculations resulting from this analysis will be used in the prediction of future fish landings under various project alternatives.

According to the Sandwich Bulkhead Rehabilitation Study, (2), there are 57 fishing boats based in Sandwich. This figure, however, is thought to include a small number of boats from Falmouth and Bourne. The harbormaster at the East Boat Basin has provided information on the composition of the Sandwich based fleet. This is presented in Table 4.

Table 4*

Composition of Sandwich Based Fleet

	Number of Vessels	
Type of Boat	Summer (6 mo)	Winter 6 (mo)
Lobster	20	0
Trawler	18	29
Scallop	6	6
Total	44	35

Note: The lobster boats operate during the summer season only. They are hauled out of the water in winter. The Sandwich fleet gains about 11 boats from other ports during the winter. This includes trawlers, seiners and draggers. Some transfer from Plymouth and Provincetown when those harbors freeze. Some seiners from New Jersey come to Sandwich for about one month in Fall to fish for herring.

*Source: Harbormaster, Sandwich East Boat Basin.

Computation of Average Unit Size and Value of Landings by Sandwich Base Boats

The unit size and value of landings for each of two categories is determined: (1) Lobster boats and (2) Non-lobster boats. In the case of non-lobster boats, no attempt is made to disaggregate by species.

(Lobster)

Total 1977 landings by Sandwich based boats: 150,000 lbs.
Number of lobster boats: 20

$$\frac{150,000}{20} = 7,500 \text{ lb/boat/yr}$$

Average length of lobstering season: 15 weeks

$$\frac{7,500}{15} = 500 \text{ lb/boat/week}$$

Average number of landings per week: 5

$$\frac{500}{5} = 100 \text{ lb/landing}$$

Value of lobster landed by Sandwich based boats: $282,000

$$\frac{282,000}{150,000} = \$1.80 \text{ lb}$$

[Aggregation of all Other Species]

Total 1977 landing by Sandwich based boats: 3,218,143 lb.

Number of non lobster boats: 30*

*Note: This number represents annual boat equivalents. From Table 3 we have 24 half boat equivalents for summer and 35 half boat equivalents for winter, totaling 59 half boat equivalents. This reduces to 29.5 annual boat equivalents (rounded to 30).

$$\frac{3,218,143}{30} = 107,271 \text{ lb/boat/yr}$$

Average annual number of landings per boat: 50

$$\frac{107,271}{50} = 2,145 \text{ lb/landings, say } 2,150 \text{ lb/landing}$$

Value of all species (except lobster) landed by Sandwich based boats: $1,276,495

$$\frac{1,276,495}{3,218,143} = \$0.40 \text{ /lb}$$

With Project Conditions

Two basic project alternatives are under consideration with respect to the expansion of the East Boat Basin:

(1) Open mooring - This would involve all Federal cost.

(2) Berthing with slips and floats - This would involve Federal cost for the channel and turning basin only.

The two project alternatives do not include a specific mooring arrangement. The projections of numbers of boats have been made by using rough boat per acre figures for both open mooring and slip berthing obtained from sources experienced in these areas. This method was deemed satisfactory for determining economic feasibility and determining if further study is warranted. It was assumed that no boats would transfer from nearby New England ports. The projections reflect an increase of new boats.

Both basic plans provide a total berthing or mooring space for commercial craft of about 4 acres. This is triple the space currently available for commercial craft. Table 5 presents the commercial fleet forecast under variations of each of the plans. Note that all figures include the present fleet.

Table 5

Commercial Fleet Forecast

Plan	Depth (MLW)	Total No. of Boats (Includes present fleet)	Breakdown By Length (ft) Average = 40 30-45	45-60	Average = 75 60-80	80-100
A	-15	100	38	30	19	13
B	-15	134	51	40	26	17

In order to focus attention on the increases in the commercial fleet the data above has been reorganized and is presented in Table 6 and 7.

Table 6

Projected Increases in Commercial Fleet - Plan A

	Number of Vessels	
	Current	Increases
Small Fishing Vessels (Average 40′)		
Homeport	40*	28
Large Fishing Vessels (Average 75′)		
Homeport	0	32
Transients	30	0

*Note: This figure represents equivalent boats including lobster boats.

Table 7

Projected Increases in Commercial Fleet - Plan B

	Number of Vessels	
	Current	Increases
Small Fishing Vessels (Average 40′)		
Homeport	40	51
Large Fishing Vessels (Average 75′)		
Homeport	0	43
Transients	30	0

It should be noted that the increases projected in Figures 6 and 7 are assumed not to be comprised of lobster boats. No substantial growth in the lobster fleet is expected.

Based on the projected growth of the Sandwich based commercial fishing fleet, the ultimate size and value of the increased catches have been computed. Table 8 summarizes the results.

Table 8

Ultimate Increments in Size and Value of Fish

Landings at Sandwich*

Plan	# Boats	lb per Landing	# Landings Per Year	# Boats	lb per Landing	# Landings Per Year	Increment lb/yr (1,000's)	Price Per Lb.	Value of Increment ($1,000)
A	28	2,150	50	32	40,000	10	15,810.0	0.40	6,324
B	51	2,150	50	43	40,000	10	22,682.5	0.40	9,073

*It is assumed that the increment in landings is entirely due to growth in the Sandwich based fleet.

We presume that it will take about 10 years to realize the ultimate increments tabulated in Table 8. A constant rate of growth is assumed.

4. Recreational Boating

Recreational boating benefits are taken as equal to the net return of the depreciated investment in boats received by owners of equivalent boats for hire.

Without Project Conditions

According to the harbormaster at the East Boat Basin, the recreational fleet is currently composed of 112 vessels. This figure is made up as follows:

82 berthed boats	70	Permanent (mostly power boats)
	12	Transient (mostly sailboats)
30	Anchored boats (nightly average over 12 week summer)	
112	Total	

With Project Conditions

The benefit contribution for recreational boating depends upon which of the two previously discussed project alternatives one is discussing. Both plans require that a 20-slip pier now used for the largest inboards be removed. Also, the existing open mooring area in the vicinity of the Corps of Engineers pier and which is used by transient vessels will remain the same under both plans.

Alternative 1 - Open Mooring Area - Approximately 3.0 acres of additional water area would be created for recreational boating use. At an assumed mooring density of 7 boats per acre, the gain in boats due to the added area is approximately equal to the loss in boats resulting from the removal of the 20-slip pier. Hence, under this alternative the net benefit contribution is zero.

Alternative 2 - Berthing with Slips and Floats - Under this alternative it is estimated that 96 new slips can be constructed. This results in a net increase of 76 additional boats (96-20). In order to quantify the boating benefits attributable to growth, the composition of the additions to the existing fleet must be predicted. Based upon the composition of the existing fleet and also local opinion, the mix shown in Table 11 is considered to be a reasonable expectation. By reason of the long waiting list, expansion of the recreational fleet to the incremental capacity provided by the project (96 additional boats) is expected to occur immediately upon project completion. The annual benefits resulting from the immediate 76 boat expansion in the recreational fleet works out to be $204,000.

5. Summary of Project Benefits

The benefit contributions from commercial fishing and recreational boating are combined to produce total project benefits. Since the commercial fishing benefit contribution involves constant growth over a 10 year period, it is necessary to convert the ultimate increments into equivalent annual amounts. Equivalent annual amounts were determined at 7-3/8 percent and are reflected in Table 9. The computational backup for the annualization of commercial fishing benefits is presented in Exhibit A. In addition, the value of the increased fish landings has been reduced by 50 percent to account for operating expenses. Annual net benefits are found in Table 9.

Table 9

Summary of Project Benefits
7-3/8%

Plan	Commercial Fishing (Equivalent Annual Net Benefit)	Recreational Boating Benefit	Total Annual Benefit
A	$2,320,000	---	$2,320,000
B	$3,329,000	$204,000	$3,533,000

6. References

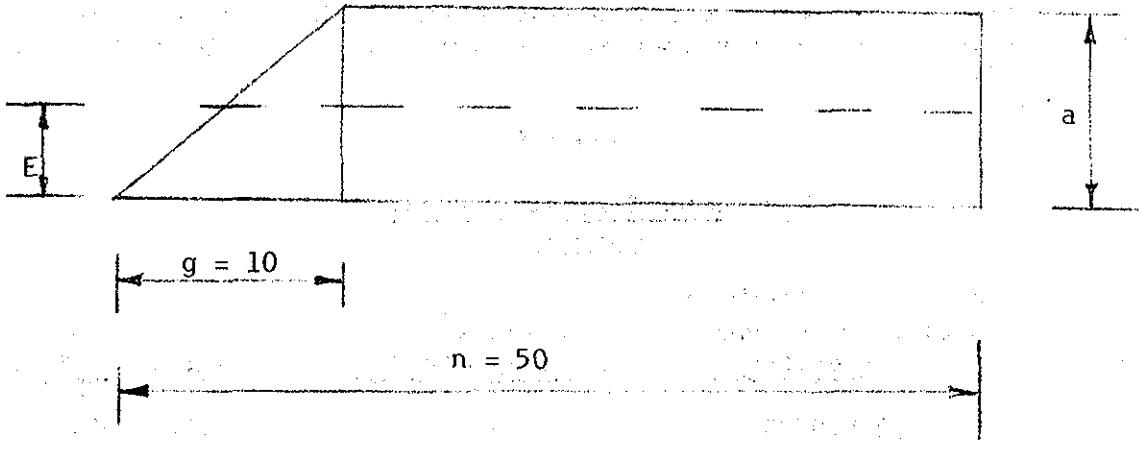
1. An Economic Profile of the Cape and Island Fisheries, The Cape Cod Planning and Economic Development Commission, 1978.

2. Sandwich Bulkhead Rehabilitation Study, Draft, Tibbetts Engineering Corp., October 1979.

7. Exhibit A

Annualization of Commercial Fishing Benefits-Assuming Constant Growth

ref: EM 1120-1-118
20 June 60 APP. II: Changel



$$E_f = \frac{1}{(1+i)^n - 1} \left[\frac{(1+i)^n + 1}{(1+i)^g} \cdot \frac{[(1+i)^g - 1]}{g \cdot i} - 1 \right]$$

$E = a\, E_f$
i = Annual interest rate
n = Project life = 50 years
g = Growth period = 10 years
E_f = Average annual equivalent factor
a = Maximum annual amount from Table 8
E = Average annual equivalent

$i = 7\,^3/_8\,\%$	$E_f = 0.733665$	NET ANNUAL BENEFIT (50% Reduction)
a = 6,324,000	E = 4,460,000	2,320,000
a = 9,073,000	E = 6,657,000	3,329,000

Table 10

RECREATIONAL BOATING BENEFITS

IMMEDIATE EXPANSION

HARBOR: SANDWICH-EAST BOAT BASIN 1980 BOATING VALUES BOATING SEASON: 120 DAYS

TYPE OF CRAFT	LENGTH (feet):	% OF BOATS	DEPRECIATED VALUES		PERCENT RETURN				VALUE $	ON CRUISE		
			Average. $	Totals $	Ideal	% of Ideal Pres.	% of Ideal Fut.	Gain		Avg. Days	% of Season	Value $
Outboards	10-14	12	3290	39480	14		100	14	5527			
	15-20	8	4350	34800	13			13	4524			
	21&Up	1	8850	8850	13			13	1151			
Sterndrive	15-20	1	6700	6700	12			12	804			
	21-25	4	10850	43400	11			11	4774			
	26&Up	0	24200	———	10			———	———			
Inboards	15-20	0	7250	———	12			———	———			
	21-30	22	17750	390500	12			12	46860	14	12	5623
	31-40	19	47650	905350	11			11	99589	18	15	14938
	41-50	8	98050	784400	10			10	78440	30	25	19610
	51&Up	0	255800	———	9			———	———			
Cruising Sailboats	15-20	0	6100	———	8			———	———			
	21-30	0	18450	———	8			———	———			
	31-40	1	47050	47050	7			7	3294	24	20	659
	41&Up	0	93250	———	6			———	———			
Daysailers	8-15	0	2150	———	12			———	———			
	16-20	0	3800	———	12			———	———			
	21-25	0	6300	———	11			———	———			
	26&Up	0	11500	———	10		100	———	———			
TOTALS		76		2260530					244963			40830

ANNUAL BENEFITS RESULTING FROM IMMEDIATELY EXPANDED FLEET = 204133

Say $204000

6. References

1. An Economic Profile of the Cape and Island Fisheries, The Cape Cod Planning and Economic Development Commission 1978.

2. Sandwich Bulkhead Rehabilitation Study, Draft, Tibbetts Engineering Corp., October 1979.

PROJECT COSTS

Total First Cost

Both Plans A and B require the same amount of work (dredging, excavation and riprap), therefore the first costs will be the same for both plans.

Dredge Section A	$ 78,000
Dredge Section C	$ 234,000
Excavate Commercial	$1,162,000
Excavate Recreational	$ 702,000
Excavate Channel and Turning Basin	$ 871,000
Riprap Section D	$ 122,000
Riprap Section E	$ 262,000
Subtotal	$3,431,000
Contingencies (15%)	$ 515,000
Engineering and Design (8%)	$ 274,000
Supervision and Administration (7%)	$ 240,000
Total First Cost	$4,460,000

The total estimated first cost for either Plan A or Plan B equals $4,460,000.

Cost Proportionment

Plans A and B have the same first costs, but because of the different mooring schemes, the distribution of costs between Federal and local interests are different for the two plans. The following table shows the various responsibilities for Federal and local interests, as interpreted from the planning regulations which provide guidance for performing Federal navigation studies.

	Plan A		Plan B	
Responsibility	Federal	Local	Federal	Local
Dredge A	All	None	All	None
Dredge C	All	None	All	None
Excavate Commercial	All	None	None	All
Excavate Recreational	Half	Half	None	All
Excavate Channel and Turning Basin	All	None	All	None
Riprap D	Half	Half	None	All
Riprap E	All	None	None	All

The same table is set-up below except that dollar amounts have been inserted to reflect extent of responsibility of either Federal or local interests.

	Plan A		Plan B	
Responsibility	Federal	Local	Federal	Local
Dredge A	$78,000	0	$78,000	0
Dredge C	$234,000	0	$234,000	0
Excavate Commercial	$1,162,000	0	0	$1,162,000
Excavate Recreational	$351,000	$351,000	0	$702,000
Excavate Channel and Turning Basin	$871,000	0	$871,000	0
Riprap D	$61,000	$61,000	0	$122,000
Riprap E	$262,000	0	0	$262,000
Subtotals	$3,019,000	$412,000	$1,183,000	$2,248,000
Cont., E&D, S&A (30%)	$906,000	$123,000	$355,000	$674,000
Total	$3,925,000	$535,000	$1,538,000	$2,922,000

- Plan A - Federal contribution - $3,925,000 - 88%
  - Local contribution - $535,000 - 12%
- Plan B - Federal contribution - $1,538,000 - 34%
  - Local contribution - $2,922,000 - 66%

Annual Charges

Maintenance Dredging

To determine annual maintenance dredging charges, 4% of the dredged material was assumed as the shoal rate. The commercial area, recreational area and channel and turning basin areas, which are excavated areas, will have an assumed dredging cut of 5 feet to determine the annual maintenance dredging quantities.

Excavated Section	Resultant Quantity (5 ft. cut)
Commercial	5/26 (232,320) = 32,270 c.y.
Recreational	5/29 (140,360) = 24,200 c.y.
Channel and Turning Basin	5/36 (174,240) = 24,200 c.y.

Section	Quantity (c.y.)				Dredging Maintenance Charge		
A	8,710	x	.04	x	$9/c.y.	=	$3,140
C	25,980	x	.04	x	$9/c.y.	=	$9,350
Commercial	32,270	x	.04	x	$9/c.y.	=	$11,620
Recreational	24,200	x	.04	x	$9/c.y.	=	$8,710
Channel and Turning Basin	24,200	x	.04	x	$9/c.y.	=	$8,710
					Total Maintenance Dredging	=	$41,530

Riprap Maintenance

Maintenance of riprap has been assumed to be $2,000 annually for both plans.

Aids to Navigation Maintenance

Maintenance of aids to navigation has been assumed to be $1,500 annually for both plans.

Total Annual Maintenance Charges

Maintenance Dredging	$41,530
Riprap Maintenance	$ 2,000
Aids to Navigation	$ 1,500
Total Annual Maintenance Charge	$45,030

Proportionment of Annual Maintenance Charges

The Federal government assumes all maintenance of a Federal project. The Plan A Federal project consists of the total expansion project and the Plan B Federal project consists of a channel and turning basin, and the dredged Sections A and C only. The proportionment of maintenance responsibilities is based on the above delineation of the Federal project and are summarized below.

	Plan A		Plan B	
Maintenance	Federal	Local	Federal	Local
Dredge	$41,530	0	$21,200	$20,330
Riprap	$ 2,000	0	0	$ 2,000
Aids to Navigation	$ 1,500	0	$ 1,500	0
Total	$45,030	0	$22,700	$22,330

Summary of Project Costs

This section will summarize total first costs, total maintenance charges, distribution of total first costs and distribution of total maintenance charges. The annual charges based on the amortization of the total first costs will be determined and summarized on a total project costs and proportionate project costs basis. The project costs for both Plans A and B are summarized below.

Total First Cost and Average Annual Charges

Plan	First Cost	I&A Rate	Annual Charge	Maintenance Charge	Total Annual Charge
A	$4,460,000	.0759	$339,000	$45,030	$384,000
B	$4,460,000	.0759	$339,000	$45,030	$384,000

Proportioned First Costs and Corresponding Annual Charges

Plan		First Cost	I&A Rate	Annual Charge	Annual Maintenance Charge	Total Annual Charge
A	Federal	$3,925,000	.0759	$298,000	$45,030	$343,000
	Local	$ 535,000	.0759	$ 41,000	0	$ 41,000
B	Federal	$1,538,000	.0759	$117,000	$22,700	$140,000
	Local	$2,922,000	.0759	$222,000	$22,330	$244,000

SANDWICH, MASSACHUSETTS

RECONNAISSANCE REPORT FOR NAVIGATION IMPROVEMENTS

EAST BOAT BASIN, CAPE COD CANAL

APPENDIX 2

PUBLIC VIEWS AND RESPONSES

SECTION A - PUBLIC INVOLVEMENT

SECTION B - PUBLIC RESPONSE

Prepared by the

New England Division, Corps of Engineers
Department of the Army

SECTION A

PUBLIC INVOLVEMENT

PUBLIC INVOLVEMENT

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DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02154

REPLY TO
ATTENTION OF:
NEDPL-C

7 July 1980

ANNOUNCEMENT

INITIATION OF A NAVIGATION STUDY

FOR

EAST BOAT BASIN, SANDWICH, MASSACHUSETTS

The New England Division of the United States Army Corps of Engineers is initiating an investigation of the East Boat Basin, located on the south side of the Cape Cod Canal in Sandwich, Massachusetts, to determine whether any modifications are advisable at this time, particularly for the benefit of the existing and prospective commercial fishing and recreational boating fleets. The investigation is authorized by a resolution adopted 9 May 1978 by the Committee on Public Works and Transportation, U.S. House of Representatives.

The existing Federal project in the East Boat Basin consists of a 2.7 acre harbor of refuge dredged and constructed in the late 1930's to a depth of 13 feet. This portion was dredged under the authority of the existing project for the Cape Cod Canal which authorized the provision of accessory and minor features deemed necessary to provide facilities for the maintenance and repair of floating plant used in connection with the operation of the canal. A 4.3-acre extension to the basin originally dredged to a depth of 8 feet, was authorized by the River and Harbor Act of 1958.

The town of Sandwich and other local interests desire to expand the existing East Boat Basin to relieve the current overcrowded conditions and to accommodate the increasing recreational and commercial fishing fleets. The town purchased 11.1 acres of land adjacent to and south of the existing basin in May 1978 in anticipation of providing an extra 175 boat spaces with access through the East Boat Basin. Additional contiguous land of 11.4 acres already owned by the town will provide a total of 22.5 acres of land for development of concomitant services and goods. A map showing the existing project and a general description of the area of expansion proposed by local proponents is attached as Inclosure 1.

The study will advise the Congress on whether there is a Federal interest in improvements or other modifications to the existing East Boat Basin Project based on applicable Federal laws and policies. A favorable recommendation will require that the navigation improvements be economically justified, i.e.,

the benefits attributed to the project exceed the cost of construction and subsequent maintenance; that the environmental, social, and/or other consequences of the project are generally acceptable to the publics; and that a local cooperating agency formally indicates its willingness and capability to provide the non-Federal requirements for the project.

The New England Division will conduct the study in three stages, in accordance with the planning procedures established by the Corps of Engineers' regulations which are responsive to the Water Resources Council's "Principles and Standards for Planning Water and Related Land Resources." These procedures are summarized in Inclosure 2 for your information.

Presently, we are conducting Stage 1 investigations to determine the need for and extent of future work required for the study. These investigations involve analyzing current and probable future conditions in the East Boat Basin area to identify navigation needs and other water and related land resource concerns which should be addressed by the study. Based on available information and preliminary engineering, environmental, and economic studies, we will evaluate those solutions which appear to be the most viable to determine whether improvements for navigation and possibly other water resource needs are sufficiently justified economically to warrant further study. The results of these Stage 1 studies will be summarized and presented in a Reconnaissance Report. If these studies result in favorable findings, we will develop a Study Program to outline the effort and schedule of work to be performed in Stages 2 and 3 of the Study.

I wish to emphasize that the Corps of Engineers considers active public participation in our studies critical to the success of developing acceptable projects that are responsive to the current and future water and related land resource needs of the nation. In this regard, we are developing a program for public participation in the East Boat Basin Study to provide for the interchange of information between the interested publics and the Corps of Engineers. This program will allow public input to influence the development and evaluation of plans in reaching a study decision. In soliciting public input to Stage 1 of the study, we intend to conduct a public meeting; coordinate with appropriate Federal, State, and local government agencies; meet with various boating, commercial fishing, and environmental interests; and attempt to contact all other interested parties.

At this time, we are interested in obtaining any available information you may have concerning the navigation problems and needs or other water and related land resource needs in the East Boat Basin area. This information, which will be considered in Stage 1 studies, can include:

1. The number, type, and draft of the commercial fishing and recreational boating fleets.

2. The amount of commercial fishing in recent years.

3. The description of any restrictions in commercial fishing and recreational boating due to inadequate channels and/or land based facilities.

4. The description of expected future expansion of navigation facilities including commercial fishing industry, and marinas.

5. Or other information describing navigation conditions in the area.

We also will welcome your views and opinions on other problems and desired improvements which should be considered in the study. If the information is too voluminous for immediate transmittal, a letter including a list of available data that you could provide would allow us to make arrangements to review and possibly obtain the information. It would be appreciated if information could be furnished within 30 days after receipt of this notice.

Correspondence providing information or raising questions concerning the East Boat Basin Study should be addressed to:

Division Engineer
U.S. Army Corps of Engineers
New England Division
424 Trapelo Road
Waltham, MA 02154

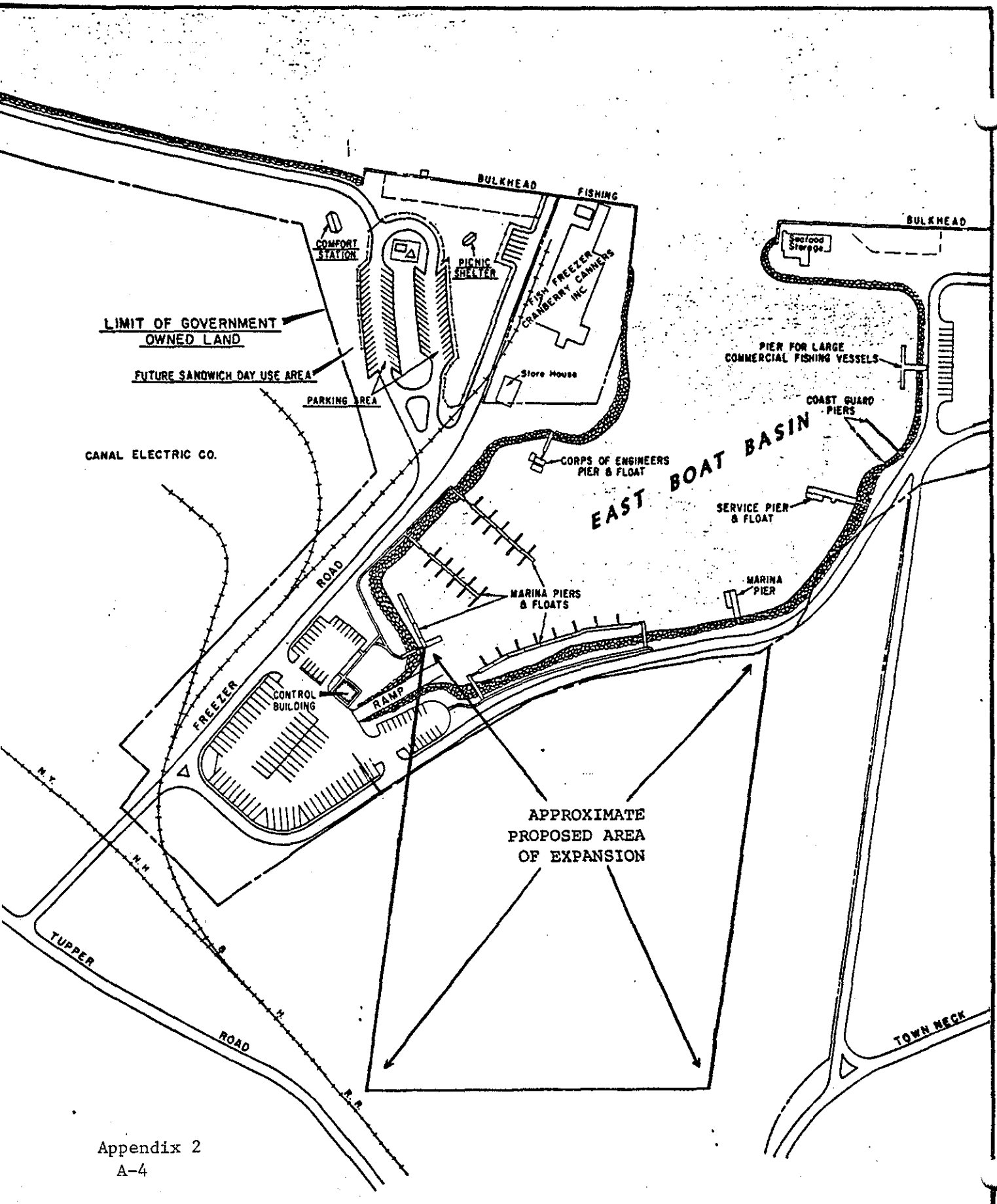
Please feel free to contact me by telephone at (617) 894-2400 or in my absence, Mr. James Abcouwer, Project Manager, at (617) 894-2400, Extension 556.

We have attempted to send this notice to all individuals and organizations who may have an interest in this study. If you know of anyone who may desire to be involved, and who has not been contacted by us, please provide them with a copy of your letter or ask them to contact our office.

Sincerely,

MAX B. SCHEIDER
Colonel, Corps of Engineers
Division Engineer

2 Incls
1. Project Map
2. Summary of Corps of Engineers Planning Procedure



Appendix 2
A-4

INCLOSURE 1

U.S. ARMY CORPS OF ENGINEERS
WATER AND RELATED LAND RESOURCES PLANNING

LEGISLATIVE AND EXECUTIVE POLICIES

The U.S. Army Corps of Engineers Engineering Regulations (ER 1105-2-200 series) established procedures for conducting feasibility studies for planning Federal water and related land resources projects. These procedures are consistent with the requirements of legislative and executive policies including the Water Resources Council's "Principles and Standards for Planning Water and Related Land Resources," the National Environmental Policy Act of 1969 (PL 91-190), Sections 122 and 209 of the River and Harbor Act of 1970 (PL 91-611), the Federal Water Pollution Control Act Amendments of 1972 (PL 92-500), as well as others. In addition, the planning of Federal Water Resources projects reflects the requirements of Executive guidelines including pertinent Executive Orders.

PLANNING GOALS

The Water Resources Planning policy instituted by the Principles and Standards (P&S) for Federal and Federally assisted water related land planning identifies two national goals towards which planning should be directed, and a system of four accounts to measure plan effects. The two national goals towards whose enhancement the formulation of alternatives will be directed are National Economic Development (NED) and Environmental Quality (EQ). The national objective of economic development is achieved by increasing the value of the nation's output of goods and services and improving national economic efficiency. The national EQ objective is to enhance the quality of the environment through the management, conservation, preservation, creation, restoration, or improvement of the quality of certain natural and cultural resources and ecological systems.

The system of accounts to be established displays the beneficial and adverse effects of each alternative plan for the NED and EQ national goals, and for the categories of Regional Development (RD) and Social Well-Being (SWB) toward providing a basis for plan comparison and decision-making. Contributions to Regional Development (RD) are determined by evaluating a proposal's effects on a region's real income, employment, population, economic base environment, and social development. Contributions to the Social Well-Being Account (SWB) are determined by evaluating a proposal's effects on real income, security of life, health and safety, education, cultural and recreational opportunities, emergency preparedness, and other factors.

INCLOSURE 2

CORPS OF ENGINEERS PLANNING PROCESS

The Corps of Engineers planning procedures establish a planning framework to guide planning for the conservation, development, and management of the water and related land resources. The framework requires the systematic preparation and evaluation of alternative ways of addressing problems, needs, concerns, and opportunities under the Principle and Standards (P&S) objectives of National Economic Development (NED) and Environmental Quality (EQ). This results in information necessary to make effective choices regarding resource management under existing and projected conditions. Alternative plans are formulated without bias to structural or nonstructural measures.

Plans are developed in three stages, initial, intermediate, and final. During the initial stage, planners formulate a conceptual plan of the study to guide subsequent planning. During the intermediate stage, a broad range of plans is developed and analyzed. In the final stage, plans are screened and detailed plans are developed to furnish a basis for selection and recommendation. During each stage, four functional planning tasks are accomplished. They are problem identification, formulation of alternatives, impact assessment, and evaluation. The four planning tasks are emphasized in varying degrees in the different planning stages. Problem identification is the most important task during Stage I studies, whereas the emphasis shifts more toward impact assessment and evaluation in Stage II as more detailed plans are developed. Figure 1 shows the relative emphasis placed on each task during the various study stages. On the figure, the relative amount of emphasis placed on each task is indicated by the size of the block as compared to the size of the other blocks in that stage. A higher level of detail for data and analysis and more precise alternative plans are obtained as the study progresses through each plan development stage. The process of iterating the four planning tasks in each stage provides flexibility to the study to be receptive to changing needs, rising opposition, or support for modified alternatives, new and refined data, and more appropriate or modified alternatives. Further, this approach provides a systematic planning process to allow for review by higher Corps of Engineers echelon and public interests, and to facilitate study management.

STAGE 1 - RECONNAISSANCE.

The general purpose of this stage is to make an initial analysis of water and related land resource management problems and solutions to determine whether additional study is warranted and to develop a study program for subsequent planning. During this initial stage, the four planning tasks are performed at a preliminary level of detail to define the scope and character of the study and delineate planning objectives, including the range of issues related to resource management in the study area and the alternative solutions to these issues. Because of the introductory nature of the planning tasks at this stage, the effort generally involves gathering and analzying a wide range of available information and public views and desires. The product of this stage is a Reconnaissance Report which documents the Stage 1 findings, justification for further study, and the program for work in Stages 2 and 3, including the study cost schedule.

STAGE 2 - INTERMEDIATE PLANS.

The purpose of Stage 2 is the selection of alternative plans which will be considered for recommendation during Stage 3. In Stage 2, all viable alternatives will be evaluated to determine their feasibility from economic, environmental, engineering and public acceptability viewpoints. Decisions made during Stage 2 must include a determination of the Federal interest in the alternative plans based on Federal laws and policies. Based on a more definitive analysis of the problems and needs in/or related to the study area, alternative management plans will be formulated without concentrating on detailed engineering design and impact quantification. The data will be sufficient to set forth and analyze the feasibility of alternative resource management plans. The potential impact of these alternative plans will be assessed, concentrating on significant contributions to the four accounts of NED, EQ, RD, and SWB as well as public perceptions of these impacts. The results of this effort will be used to decide which management plans warrant detailed considerations in Stage 3.

STAGE 3 - FINAL PLANS.

The objective of the final planning stage is the selection of a plan for recommendation. During Stage 3, emphasis is on modifying, assessing, and evaluating the intermediate alternatives carried into Stage 3 to produce detailed, implementable plans. The product of Stage 3 is the final study document which presents the recommendations of the Division Engineer, including information on the overall study findings, Environmental Impact Statement, and pertinent information from interested publics leading to the recommendations. The design, impact assessment, and evaluation of the final alternative plans will require specific and well-defined data at a comparable level for each plan in such a way that an effective choice can be made by the decision-making publics.

PUBLIC INVOLVEMENT.

The general policies of the Corps of Engineers for public involvement and citizens participation are provided in Engineering Regulation 1105-2-800, "PUBLIC INVOLVEMENT: GENERAL POLICIES." In this regulation, "public" is defined as any affected or interested non-Corps of Engineers entity. This includes other Federal, regional, State, County or local government agencies and officials, public and private organizations, and individuals.

It is the policy of the U.S. Army Corps of Engineers that water resources studies be conducted in an atmoshpere of public understanding, trust, and mutual cooperation. The objective of public involvement and citizens participation is the active involvement of the public in water resources studies to assure that they respond to public needs and preferences to the maximum extent possible, within the bounds of local, State and other Federal programs, responsibilities and authorities.

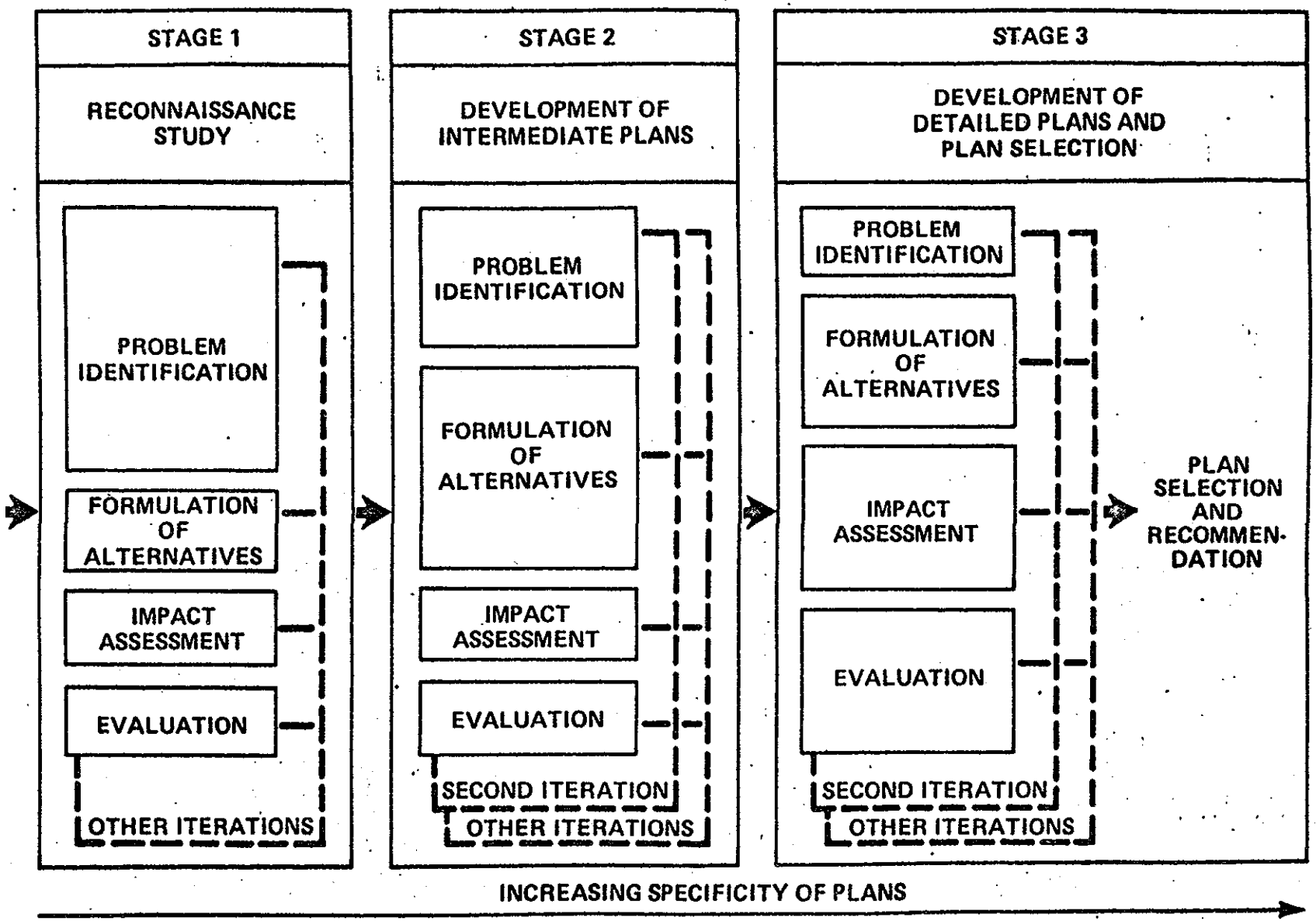


FIGURE 1: GENERAL RELATIONSHIP OF PLAN DEVELOPMENT STAGES AND FUNCTIONAL PLANNING TASKS

SUMMARY OF CORPS OF ENGINEERS FIELD TRIPS

Corps of Engineers personnel have made a series of field trips to the East Boat Basin and town of Sandwich from 1978 to the present, concerning the expansion of the East Boat Basin. Generally, meetings have been with local officials, such as the town of Sandwich selectmen, town engineer, and the East Boat Basin harbormaster. Upon occasion staff members of congressmen and the news media have been present.

Early meetings concerned the possibility of Corps of Engineers' participation in an expansion project at the East Boat Basin. Local officials were informed of the procedure necessary to have the Corps initiate a study. This has been done and a study is presently in progress.

The latest meetings concerned explanation of Corps of Engineers navigation projects cost sharing responsibilities and the collection of data necessary for the study. The results of these meetings were that the local interests have a clearer understanding of what the Corps of Engineers can do, and the first stage of study is essentially complete.

A meeting with local officials was recently held in order to discuss any items of interest, gather information, review the study to this point, and discuss the direction of future study.

SECTION B

PUBLIC RESPONSE

PERTINENT CORRESPONDENCE

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THE COMMONWEALTH OF MASSACHUSETTS

METROPOLITAN DISTRICT COMMISSION
20 SOMERSET STREET, BOSTON 02108

PUBLIC INFORMATION OFFICE
727-5215

July 14, 1980

Max B. Scheider, Colonel
Division Engineer
U.S. Army Corps of Engineers
New England Division
424 Trapelo Road
Waltham, Mass. 02154

Reply NEDPL-C

Dear Colonel Scheider:

The East Boat Basin project in Sandwich, Massachusetts, as outlined in your announcement of 7 July 1980 is of interest.

The expanding commercial fishing fleet is in need of harbor refuge of this type.

The ever growing numbers of recreational boats, when traversing the Cape Cod Canal, have use for this facility.

It is wise to keep in mind the possibility of contaminated dredge spoil being moved about, especially if marinas or marine railways have been in place over an extended period of time. Boat paints contain lead!

As the requirements regarding sewerage holding tanks aboard recreational vessels are enforced, the facilities for pumping-out become more important and the type and size involved is a critical component of this type boat basin. This will have an environmental impact on the contiguous land area or the treatment facility of the town.

Thank you for the opportunity to respond to your announcement.

Sincerely,

Captain Albert A. Swanson
MDC Historian

ANTHONY D. CORTESE Sc. D
Commissioner

PAUL T. ANDERSON
Regional Environmental Engineer

The Commonwealth of Massachusetts

Executive Office of Environmental Affairs

Department of Environmental Quality Engineering

Southeast Region

Lakeville Hospital, Lakeville, Massachusetts 02346

July 15, 1980

Division Engineer
U.S. Army Corps of Engineers
New England Division
424 Trapelo Road
Waltham, Massachusetts 02154

RE: Navigation Study for East Boat Basin,
Sandwich, Mass. - NEDPL-C

Dear Sir:

The Department of Environmental Quality Engineering, Southeast Regional Office, Division of Wetlands Protection, has reviewed the above-referenced project and would like to submit the following comments.

Although it appears from the July 7, 1980 Announcement that the proposed expansion of the East Boat Basin will involve primarily upland areas this office would like to bring to your attention the Massachusetts Coastal Regulations which were promulgated pursuant to Massachusetts General Laws, Chapter 131, Section 40, the Wetlands Protection Act. Certain Sections of the Regulations (i.e., Land Under the Ocean, Salt Marshes, Land Containing Shellfish, etc.) may apply to portions of the proposed work.

Please keep this office informed during the various planning stages so as to avoid any environmental conflict at a later date.

Thank you for your cooperation in this matter and if you should have any questions, please contact this office at 947-1231, ext. 224.

Very truly yours,

For the Commissioner

Paul T. Anderson

Paul T. Anderson, P.E.
Regional Environmental Engineer

A/jt/JB

cc: Conservation Commission

Michael Penny, CZM

TOWN OF SANDWICH

THE OLDEST TOWN ON CAPE COD

P.O. BOX 660
SANDWICH, MASSACHUSETTS 02563
TELEPHONE 888-0157

OFFICE OF THE:
BOARD OF SELECTMEN
BOARD OF ASSESSORS

July 23, 1980

Department of the Army
New England Division, Corps of Engineers
424 Trapelo Road
Waltham, MA 02154
Attn: Coastal Development/Major Seltz

Dear Major Seltz,

The Board of Selectmen has attempted to distribute as best we can the Navigation Questionnaires and other appropriate forms to the commercial fishermen, recreational boat owners, et al concerned with the East Boat Basin.

We have also notified the public through the media that forms are available in our office.

We will be glad to assist in collecting further data once the smoke has cleared and people who are going to return forms have done so.

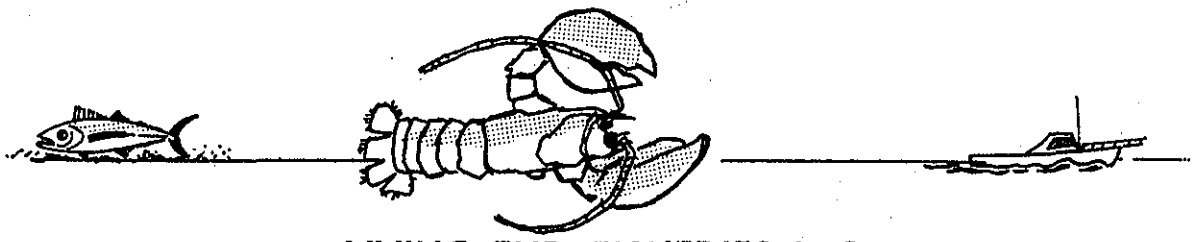
We look forward to hearing from you in the near future.

Very truly yours,

BOARD OF SELECTMEN

David P. Persson

DPP/jb



LIVING END FISHERIES INC.

Capt. Jim Smith

328-3078 • 222 HOLBROOK ROAD, QUINCY, MASS. 02171 • 759-3273

JULY 24, 1980

DIVISION ENGINEER
U.S. CORP. ENGINEERS
N.E. DIVISION
424 TRAPELO RD
WALTHAM, MASS.

DEAR MR. ABCOUWER:

I WOULD LIKE TO RECIEVE A COPY OF THE SURVEY INFORMATION RECENTLY POSTED AT THE LOCAL POST OFFICES TITLED:

"CAPE COD CANEL BOAT BASIN" # NEDPL-C DATED 7/7/80 SANDWICH BOAT BASIN.

I AM INTERESTED IN THIS EXPANSION PROPOSAL AND I WOULD LIKE TO KEEP-UP TO DATE ON ITS FUTURE.

THANK YOU,

James E. Smith

July 30, 1980

Division Engineer
U. S. Army Corps of Engineers
New England Division
424 Trapelo Road
Waltham, Massachusetts 02154

Dear Sir:

I am writing with regards to the Navigation Study for the Expansion of the East Boat Basin at Sandwich on the Cape Cod Canal.

I am a recreational boat owner and have had a boat at the Sandwich Marina for about 12 years now. During this period I have seen the number of pleasure craft, as well as commercial fishing vessels increase many times, with the results of causing gross overcrowding of the facilities to the point of it being unsafe now when trying to approach your slip. On weekends, especially, there are as many as 27 boats anchored in the Harbor of Refuge, and of course, this is stretching the available space beyond its normal accomodations. There are times when the fishing vessels extend out beyond the exit and approach channel for the Coast Guard vessels and cause serious impedance to their safety missions.

The area neeeds to be expanded to include more facilities for larger craft of both fishing and recreational purposes. Sandwich is a natural jumping off point for boats transiting the Canal and headed to the North. The towns people would greatly benefit from the increased facility.

The anchorage needs to be swept and increased to a minimum of 12 feet. On Saturday, July 26, 1980, the ENCHANTRA, a 67' ketch drawing 10 feet grounded at MLW in the middle of the Harbor of Refuge.

The expansion program is needed desparately both for the safety of existing recreational and fishing vessels, and also for the increase in fishing activity which is necessary to the economic growth of the town.

Very truly yours,

Wallace S. Morrow III

Wallace S. Morrow III
Master, SS OGDEN CHAMPION
Yacht, PHOENIX

888-2775

Sandwich Water District
72 TUPPER ROAD, BOX 600
SANDWICH, MASSACHUSETTS 02563

July 30, 1980

Division Engineer
U. S. Army Corps. of Engineers
New England Division
424 Trapelo Road
Waltham, MA 02154

Re: East Boat Basin

Dear Colonel Scheider:

Enclosed is my response to your questionnaire regarding the East Boat Basin:

What kind of improvements and difficulties:

I believe that the present harbor is too small for pleasure boats, we could use at least twice as many docks, rack storage could supplement some fo the needs of the families who only use their boat on weekends. Parking for the present harbor and the launching ramp is inadequate and over crowded.

The commerical fishing fleet only has one dock to tie up at, which at numerous time during the year it is not uncommon to see twenty to forty draggers tied side by side. If one boat, say should sink or catch fire the damage would be in the millions of dollars, a loss most of our local fishermen could never recover from. At these times when the weather or whatever forces the draggers in, the present Coast Guard rescue boats have been blocked off, which means time delays which could possible mean life or death to the person or people waiting the arrival of the rescue boat.

The one dock that the lobstermen have serves about two dozen fishermen, which means costly delays in loading and unloading for these local men.

At present the fishermen have only one place to sell their fish and only one place to seee their lobsters. Some of the small fishermen haul their catches to Hyannis, 17 miles one way or to Buzzards Bay, 8 miles one way.

We have only one gas dock which in the summer season if you are able to fuel up in say one hour you are lucky.

To sum up:

1. At least double the size of the harbor.
2. Increase the parking.
3. Provide dock space for commerical fishermen.
4. Bulkhead for additional space.
5. Provide space for additional services such as fish processing plants.
6. Rack storage for the smaller pleasure boats.
7. Improve the Coast Guard dock space.

Fishermen:

I am not a fisherman but would like to comment on a couple of items I feel are important. The draggers unloading at the bulkhead on the canal are frequently damaged when the wake of other boats force their boat into the pilings while they are unloading at the only place in Sandwich. Supplies for these men must come from New Bedford (about 35 miles one way) and for major repairs it is a long trip to Boston.

Recreational Boats:

Yes, I own one with my father, it is a Pen Yan, 20 foot, worth about $5,000.00 moored in the present Sandwich Marina dock, used approximately 100 days a year. The improvement would mean less down time therby we could use it more often. With the cost of dock space about $1,500.00 per year, the cost of repairs would go down by having repair/service available.

I don't own a business but the enlargement will provide jobs for the Town which is greatly needed in Sandwich. Economically the enlargement would have a far reaching effect on the community, not only by providing jobs and aiding all boaters, but also by enticing new business into the Town, more fishing boats, fish related business and it has to improve/ increase the volume of business for all existing businesses. I would be willing to have Sandwich spend money for these improvements. The amount spent would be returned 100 fold to the Town with the benefits that the whole Town would realize economically from the increased fishing industry and pleasure boats.

I would like to thank you for allowing me to be of assistance to you in this very important stage of the planning of, hopefully our newly enlarged Boat Basin.

If I can be of any further assistance, please feel free to call upon me.

Yours truly,

Robert R. Kreykenbohm
Superintendent
Sandwich Water District

RRK/su
cc: David P. Perssons
Selectman, Town of Sandwich

Plankton Nets

888-1896

T. E. YOUNG
Rt. 130
Box 101
Sandwich, Ma.
02563

Oceanographic Equipment

Steel Fabrication

888-0442

August 5, 1980

Max B. Scheider, Colonel
Department of the Army
New England Division, Corps of Engineers
424 Trapelo Road
Waltham, MA 02154

East Boat Basin
Sandwich, MA

Dear Colonel Scheider,

I greatly appreciate the opportunity provided by the Corps of Engineers,for people directly involved with boating to express their opinion, I am fifty-one years old and have been continuously involved with boats, commercial and pleasure, since childhood. I was born in Hyannis, where my father had a machine shop and two marine railways with repair and building facilities. I have been doing welding and repairing on commercial and pleasure craft and shore facilities in Sandwich since 1947. I have also built a fifty foot, forty-one ton, gross, steelmotor sailer for commercial use and is documented for research and fishinf. This boat is in the basin now.

It is with this background that I would like to offer these suggestions and observations on the present harbor and the proposed expansion.

I think a major consideration should be the projected usage - given the fuel situation. A reasonable assumption is that pleasure craft usage will decline while commercial fishing changes to include some deep draft sailing and coal fired steam vessels. The existing harbor should be bulkheaded and future expansion bulkheaded except for ramps and railways.

Railways are in urgent need. The use of mobile rige for hauling larger vessels is dangerous and damaging. Large bollards should

be installed on the shore for commercial vessels in tying up and springing off when getting under way. A solid surface, not necessarily paved, should be provided adjacent to the bulkheads for work on nets, dredges, wire ranging, leading and unloading trucks etc.. Provisions for competitive repairing, refueling and provisioning should be made. A harbormaster with a marine background comparable with the projected usage as a commercial port and harbor of refuge should be strongly considered.

Attention should be paid to the commercial facilities of such ports as New Bedford, Gloucester, and Point Judith as a lot can be gained and learned from their many years of practical experience and this knowlege can be applied to Sandwich.

Provisions should be made for the maintainance and repair facilities to reduce replacement costs and to better insure the safety of people and boats.

Sincerely,

Theodore E. Young

COASTAL ZONE
MANAGEMENT

The Commonwealth of Massachusetts
Executive Office of Environmental Affairs
100 Cambridge Street
Boston, Massachusetts 02202

August 6, 1980

Colonel Max B. Scheider
U.S. ARMY CORPS OF ENGINEERS
424 Trapelo Road
Waltham, Mass. 02154

Dear Colonel Scheider:

We are pleased to offer our full support for the Initiation of a Navigation Study for East Boat Basin, Sandwich, Massachusetts. We feel that the "Feasibility Study-East Boat Basin Expansion, Sandwich, Massachusetts" (Tibbetts Engineering Corp., April 1979, for the Town of Sandwich) provides excellent initial documentation that the navigation improvements can be economically justified and that there is widespread public acceptance of the concept. The Tibbetts Report cites that an initial investment of $16 to $19 million dollars could yield a benefit cost ratio of 5.6 to 1 and could result in a threehold increase in fish landings at the East Boat Basin (pp. 1 and 42-48).

Furthermore, Policy 14 of the Massachusetts Coastal Zone Management Plan provides conceptual support for the study and solution of fishery related problems. Policy 14 reads in part:

> "Encourage and assist commercial fisheries research and development, restriction and management of fisheries resources..."

We might note that this Policy provided us with the initiative to partially fund the referenced study of the East Boat Basin expansion.

As you know, other MCZM policies present conditions for the conduct of various activities affecting marine resources. We expect to be closely working with you during all stages of the Navigation Study to ensure that final plans for the East Boat Basin are consistent with CZM policies dealing with construction in or modification of coastal resources and dredging and disposal.

Finally, several CZM staff members are very familiar with fishery management and resource development issues in Massachusetts. During the next several weeks they will be searching for and gathering together information that may be useful to you in Phase I of the Navigation Study. At any time during your study, you or any of your staff are welcome to call on us for consultation or specific assistance. Mr. Michael Penney of our staff will be happy to coordinate any such requests.

Sincerely,

Edward J. Reilly
Assistant Secretary

EJR/MEP:dc

cc: Bill Taylor, Town Engineer, Sandwich
Marta Braiterman, Regional Coordinator, CZM

E.T. MOFFITT CORPORATION
MANAGEMENT CONSULTANTS
BUSINESS MANAGEMENT
68 Town Neck Road Sandwich, Massachusetts 02563 Telephone 888-1059

August 7, 1980

Department of the Army
New England Division
Corps of Engineers
424 Trapelo Road
Waltham, Mass. 02154

RE: Navigation Questionnaire

The depth in the basin is not sufficient at low water for deep draft vessels. 12 ft. to 16 ft. is needed for draggers and keel sailboats.

The Sandwich Marina is leased from the U.S. Corp of Army Engineers. Facilities at this time , a launching ramp, slips for boats from 16ft to 50 ft. with 12 slips open for transient.

At present we hold reservations for all slips thru Labor day. Our permanent slips have a waiting list dating back to 1973 totaling 233 applications. All slips are filled in the Winter season by pleasure boats or fishing draggers. Facilities for fishing draggers and lobstermen are very inadquate.

There is no space left for any lobster boats to tie to the shore and anchor off. Commercial boats are forced to tie to one pier and raft off in two rows as much as 15 or more deep. There is no water or electricity available. Unloading must be done at the bulkhead on the Cape Cod Canel. When weather blows hard out of the N W to N E draggers swing and block the Coast Guard dock. Winds out of the S W swings them to the riprap

Every year more draggers attempt to tie to the pier creating a serious problem. The dredging of the basin along with additional berths to tie up will eliminate much of the problem.

E.T. Moffitt

E.T.Moffitt
Harbormaster
Sandwich Cape Cod Canal Marina

LANDING INFORMATION SHEET
(For Use With Navigation Questionnaire)

Please cross out those of the following which do not apply:
Commercial Landing
~~Public Landing~~
~~Recreational Landing~~

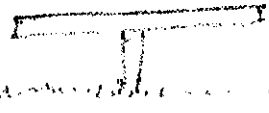
Name of Landing Sandwich East Boat Basin Commercial Pier

Owner(s) U.S Corp of Army Engineers

Location Sandwich East Boat Basin Sandwich Mass

Type of Construction Piles with Wooden deck

Dimensions 100' Long



Depth and length of berth(s) East Pier 10 - 12+ Deep 3 Rows

Kinds of unloading facilities Bulkhead on Cape Cod Canal

Kinds of storage facilities None

Is railroad siding available?	Yes ____	No ✓
Is truck access available?	Yes ✓	No ____
Is Water available?	Yes ____	No ✓
Is fuel available?	Yes ✓	No ____

What wharf fee is charged? None

If landing is only partly open to public, explain. Pier is open to Commercial Dragging and Lobster Boats only. 17 Lobster Boats Tie To the shore with Stern Anchor out in the Basin.

Number of boat owners or shipping concerns using landing or pier Up To 30 At Pier - More using Bulkhead on the Canal

What is condition of landing? Excellent ____ Good ____ Fair ✓ Poor ____

Incl. No. 1 to Navigation Questionnaire No. 2

Mr. Moffitt

BOAT YARD INFORMATION SHEET
(For use with Navigation Questionnaire)

Name of ~~Boat Yard~~/MARINA Sandwich Cape Cod Canal Marina

Owner(s) Lease U.S. Govt To Town of Sandwich

Location EAST Boat Basin

Size of boats that can be serviced To 50'

Number of railways

Capacities of railways or Launching equipment Hauling/Launching done by Travel Trailers

Kinds of repairs and servicing available All Services Available on Call by independant Service People - Re Hauling - Engine Repairs - Radio Electronics. Wood - Fiberglass - Paint Hull Work

Number and size of boats that can be stored

~~Covered~~

Open 50 +

Berths 80

~~Moorings~~

Average number of boats serviced last year* 40 - 50

Average number of boats stored last year* 102

Approximate average gross valuation of business last year*
Dockage and Winter Storage plus Fuel $200,000 ±

*Have these figures changed during the past five years?
Explain. Yes increased from $70,000 To $200,000
We have on hand 232 Applications for Berths dating back To 1973 which we cannot process because of Lack of Space.

Incl. No. 2 to Nav. Questionnaire No. 2

40 Grove St.
Sandwich, Mass 02563
10 Aug 1980

Dear Sir,

A few brief comments in response to the Navigation Questionaire for the East Boat Basin, Sandwich.

If possible at the expense of the Federal Government more fishing interest would make use of this area. I would encourage it. However, what would the rental of slips be, who would get that money?

Under no circumstances should Town money be spent to benefit recreational boaters. I do not think the taxpayer should be burdened by something that would only benefit a few, and most often not town residents.

Time does not allow me to respond to this subject further.

If in the future you have further question I would be glad to comply.

Sincerely,
John G. Stein
John G. Stein

SANDWICH
CAPE COD CANAL
MARINA
BOX 152 SANDWICH, MASS. 02563
TEL. 888-2500

August 18,1980

Planning Division
New England Division
Corp. of Army Engineers
424 Trapelo Road
Waltham, Mass. 02254

Re: Permanent and Transient Slips
Sandwich Marima

Length of Slips	out board	in (STERN) board	power (IN-BOARD)	sail	Trns.	Total	Application on file	oldest Date
Boats up to 20'	20	1			1	22	62	May 72
" 20 to 24'	1	4	13	1	3	22	56	Apr.72
" 25 to 28'			9		1	10	51	June 72
" 29 to 33'			12		2	14	27	May 75
" 34 to40"			7		5	12	19	Aug 73
" 41 to 43'			4		2	6	12	Aug.73
" 44 to 50'			4			4	8	June 74
TOTAL	21	5	49	1	14	90	235	

1979 A total of 733 transients used slips some overnight others a week or so.

1980 To date 8/17 537 transients used slips with advance reservations filling all transient slips thru Labor day and some thru Oct.15.

This past week alone we were unable to accomadate 42 boats that asked for slips without reservations.

The harbor of refuge sometimes fills to capacity with up to 50 boats at anchor. (see photo)

E.T.Moffitt
Sandwich Harbormaster

cc Selectmen Town of Sandwich

The Commonwealth of Massachusetts
Division of Marine Fisheries
~~xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx~~
~~xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx~~

Philip G. Coates
Director

18 Heritage Professional Building

Route 6A RFD 1, Sandwich, MA 02563

August 25, 1980

Division Engineer
U.S. Army Corps of Engineers
New England Division
424 Trapelo Road
Waltham, MA 02154

We, the Cape and Islands Area Team of the Massachusetts Division of Marine Fisheries, have been requested by the Sandwich Board of Selectmen to respond to the Initiation of a Navigation Study, East Boat Basin, Sandwich, Massachusetts.

Rather than answer the specific questions posed on the navigation questionnaire, along with several information sheets, we have composed a status report on commercial fishing activities in the Sandwich Basin. Our report encompasses information pertinent to Stage 1 investigations.

If we may help to provide any further information, please contact us in Sandwich.

H. Arnold Carr, Marine Fisheries Biologist
Elizabeth Amaral, Assistant Marine Fisheries Biologist Elizabeth Amaral

CC to: J. Fair, Assistant Director
Board of Selectmen, Sandwich

Sandwich East Boat Basin Commercial Fisheries Status

The Sandwich East Boat Basin is one of four major fishing ports on Cape Cod. In terms of pounds of fish landed and associated value on Cape Cod, Sandwich has ranked second to the port of Provincetown over the last three years; overall in Massachusetts, Sandwich ranks fifth in landings. In 1975, the first year for which complete landings are available, 6,383,000 lbs of fish were landed with a value of $1,753,000 (Table 1). In 1979, 17,488,000 lbs were reported, valued at $9,848,000. This does not include swordfish (Sandwich being a major swordfish port on the East Coast) at an estimated value of $2 million (pers. comm. Fed. Port Agent). Principal species landed are yellowtail flounder, winter flounder, cod, haddock, sea scallops, and lobster (both from pots and draggers). Canal Marine, the Cape's largest freezer facility, is a major offloading site for sea herring, menhaden and squid. In the month of September, Sandwich becomes a center of activity for two tuna seiners. Their high priced catch is processed for direct air shipment to Japan. As recent economic studies show[1], these landings generate a value to the local economy that may reach four times the landed value, before the fish reach retail markets. If this can be applied to Sandwich, this may mean a value to the community economy approaching $68 million.

The number of commercial vessels which call Sandwich "home" on a year-round basis fluctuates between 17 and 20. They are principally inshore draggers and sea scallopers, collectively in the range of 30-50'. The inshore commercial lobster fleet numbers 17-18 boats (1980) during the spring through fall. During 1979-80 six sea clam boats (with hydraulic dredge) have periodically made Sandwich their base of operation, working nearby clam beds in Cape Cod Bay.

Several of these boats are from Rhode Island. The size of the dragger fleet, although having a "core" of Sandwich vessels, fluctuates with the seasons and fisheries, such that vessels from Plymouth and New Bedford, for instance, may remain here up to several months if fishing is favorable nearby and/or weather dictates moving from their home port. These commercial vessels must raft (tie off, one to the next) together in two rows which has meant as many as 20 vessels per row, 40 vessels total, extending from the commercial dock to the entrance of the Basin. The lobster fleet utilizes moorings just off the rip-rap in the summer. When the recreational fleet leaves the inner Basin in late fall, the commercial vessels occupy the vacated slips (up to 50 additional vessels); this is a common phenomenon on Cape Cod in the winter months when competition for dockage decreases.

The transient fishing fleet is peculiar to the Sandwich Basin in that it utilizes the port principally for offloading (at one of four fish dealers along the Canal) and less for layover, supplies or refueling. At least 50 vessels offload at the Atlantic Coast Fillet Co. in the course of a year, coming from Sandwich, New Bedford, Westport, Scituate and occasionally, Martha's Vineyard, Rhode Island and North Carolina. This figure is based on those fishing craft which offload routinely there, but are not company-owned vessels. A new fish company, occupying the building furthest east on the bulkhead, will shortly have its own vessels fishing and landing (3-4) in addition to transients. At Canal Marine, large (up to 70') purse seiners and pair trawlers from New Bedford, Rhode Island and Hyannis offload herring during late fall and winter. Throughout the rest of the year, redfish and herring are trucked to Canal Marine freezer from other New England ports. Joe's Lobster Mart is a major lobster retail/wholesale facility which serves inshore and offshore lobster fleets.

Commercial attraction to the East Boat Basin can be summarized by the following:

1) It is a deep water port capable of unloading and docking fishing vessels with a draft more than 15 feet and 10 feet, respectively. (However, unloading can only take place along the outer bulkhead). This harbor of refuge can be considered a deep water port by Cape Cod standards and is one of three on the Cape.

2) Its virtually ice-free access and condition during the winter have permitted fishing operations to continue when most other ports are closed.

3) Its close proximity to productive fishing grounds, both on the north and south side of Cape Cod, allows the vessels to fish for species available throughout the year as well as those available seasonally.

4) It is a convenient, sometimes central, location for vessels transitting between other ports and the fishing grounds. This is reflected in the large number of transient vessels that unload here (mentioned above).

Despite the commercial attraction to the Basin, problems do exist for both transient and home-port vessels of the commercial fleet. For the latter, the existing commercial dock serves no purpose other than a "support" on which to tie the first vessel in line for rafting. It rarely serves as an offloading dock, due to its size and inaccessibility in this rafting situation. At best, it can be used by the fishermen as a platform to board their craft. Loading and offloading gear or other heavy equipment as well as refueling must be done along the outer bulkhead in the canal, unless vessels buy fuel at the Basin fuel dock.

The rafting situation is dangerous although it is presently the only form

of 'docking' for the larger commercial vessels. As mentioned previously, as many as 20 boats have tied together causing potentially hazardous navigation in the Basin, vessel damage and blockage of the Coast Guard's path. Rafting pressure increases during inclement weather, particularly in winter when the Basin is used for refuge.

More transient craft might utilize the Basin if it were not for the overcrowded conditions, coupled with basic lack of facilities - no railway, no repair shop or chandlery. Although exact figures are not known, many fishermen have made it clear they would move to Sandwich permanently if conditions were more inviting.

Even offloading is a problem: the outer bulkhead where unloading takes place is exposed to the hazards of high winds and seas. Vessels may tie up there for only short periods of time. Increased and protected offloading space to accomodate more than one vessel at a time would be desirable. We do feel, however, that the fish companies should speak out individually on this matter.

These conditions depict the present status of commercial fishing activities in the Sandwich Basin combined with input from the commercial sector. The Basin presently provides a limited facility for the commercial fleet. We feel that minimum improvements should encompass the following:

1) Increased and adequate docking space, to include bulkheading.

2) Multiple as well as protected offloading space.

3) Commercial support facilities.

[1]King and Storey. 1974. Use of Economic-Environmental Input-Output Analysis for Coastal Planning with Illustrations of the Cape Cod Region. U-Mass. Publication No. 40 Special Report.
Callaghan and Comerford. 1977. Modified Regional Input-Output Analysis of Rhode Island Commercial Fishing and Related Activities. New England Journal Bus. and Econ. 3(2).

Table 1.

Sandwich - Commercial Landings

Year-End Totals, 1975-1979

	Pounds	Total Landed Value
1975	6,383,000	$ 1,753,000.
1976	11,845,000	4,359,000.
1977	15,340,000	5,045,000.
1978	19,021,000	7,778,000.
1979	17,488,000	9,848,000.

Federal Fishery Statistics

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
ECOLOGICAL SERVICES
P.O. Box 1518
Concord, New Hampshire 03301

SEP 08 1980

Colonel William E. Hodgson
Deputy Division Engineer
New England Division, Corps of Engineers
424 Trapelo Road
Waltham, Massachusetts 02154

Dear Colonel Hodgson:

This letter is intended to aid in your planning of navigation improvements for the East Boat Basin at Sandwich, Massachusetts. It is submitted under authority of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.).

The East Boat Basin is seven acres in extent and located on the south side of Cape Cod Canal near its eastern end. Spoil from the 1964 dredging of 4.3 acres to a depth of 8 feet was placed on the south side of the harbor. The original 2.7 acres of the harbor was dredged to a depth of 13 feet and the spoil was placed on a disposal site located offshore from the eastern end of the canal.

We understand the current study is to determine the Federal Government's interest in participating in a harbor enlargement using 11.1 acres of town-owned land for excavation of additional space for commercial fishing boats and a contiguous lot of 11.4 acres for support facilities. Excavation of about a million cubic feet is expected. The town-owned lots include the old spoil area. The existing harbor will be dredged to a depth equal to the depth chosen for the new area but not exceeding 16 feet. Disposal of dredged spoil at the offshore site used for the previous spoil and disposal of excavated material from the old spoil site at upland locations is being considered.

Dredged material from the harbor should be subject to core sampling, bulk sediment, and elutriate tests to determine (a) the relative proportion of sands, gravels and silts, and (b) its level of contamination. Use of the harbor by large numbers of boats may have resulted in deposits of metals such as copper, lead and zinc from paints scraped from and applied to boat hulls and from other boat-related sources.

A survey of benthic organisms will be necessary to determine the biological activity on the harbor substrate, since we have found no publications on benthic species in the harbor. There is no shellfishing. The large number of boats crowded into the harbor could be limiting the benthic community. Finfish such as menhaden, mackerel, cunner, and other species enter the harbor at various times but the harbor is not considered significant habitat for these species.

A wildlife community has developed on the old spoil site which has a general elevation of about 11 feet above mean high water. The vegetation is dominated by grasses tentatively identified as Spartina spp., other unidentified grasses; shrubs such as bayberry, sweet gale, poison ivy, and other species. A narrow band of deciduous trees is located along the railroad tracks at the south end of the spoil site. Habitat for small mammals, songbirds, and possibly shorebirds is provided at the site. The quality of this habitat and identification of resident, nesting, and transient species of songbirds and transient or resident mammals needs to be determined so that an evaluation of habitat losses and possible mitigation measures can be accomplished. Therefore, your studies should include funds for a detailed evaluation of the vegetative and wildlife communities. We have found no reports concerning terrestrial habitat at this site.

Your study also should include consideration of beneficial use of the spoil from the harbor so that offshore disposal can be avoided. In addition, the frequency of future maintenance dredging should be determined in your studies as well as selection of a site or use for maintenance spoil.

The Massachusetts Division of Marine Resources plans to conduct finfish studies at a number of potential sites for the disposal of spoil including the site proposed for this project. These studies will start this fall and are being done under the auspices of the Massachusetts CZM program and will include benthic investigations. These studies should provide information on the biological communities existing at the proposed spoil site.

Sincerely yours,

Gordon E. Beckett

Gordon E. Beckett
Supervisor

TOWN OF SANDWICH

THE OLDEST TOWN ON CAPE COD

SANDWICH, MASSACHUSETTS

TELEPHONE 888-4[illegible]

OFFICE OF THE:
BOARD OF SELECTMEN
BOARD OF ASSESSORS

October 3, 1980

Dirk Zwart, Project Manager
Sandwich East Boat Basin
U.S. Army Engineer Division
New England Corps of Engineers
424 Trapelo Road
Waltham, MA 02154

Dear Mr. Zwart,

The Board of Selectmen would like to thank you for this opportunity to respond to Navigation Questionnaire Form #2 concerning the proposed expansion of the East Boat Basin.

You have been provided with various information concerning the fish landings, commercial facilities, commercial boat numbers, recreational boat numbers and a whole assortment of required statistics. What I propose to do is provide a general overview of the project as seen by the Board of Selectmen.

1. DESCRIPTION OF IMPROVEMENT WANTED. The purpose of the expansion is to promote and facilitate commercial fishing from the port of Sandwich. Presently Sandwich ranks fifth in Massachusetts in total fish landings. What is desired is to expand the present harbor facility utilizing a 22 plus acre site which has been acquired by the Town of Sandwich. Through the Coastal Zone Management Program, we have completed a very preliminary study as to what the Town would see as a desirable expansion. This report, prepared by Tibbetts Engineering, is enclosed. You will please note there are two different proposals for improvement. We are certainly open to proposals that accomplish our declared goal. The Town relies upon the expertise of the Corps of Engineers in designing the actual site, maximizing the Corps participation in the project. I think you will find that the Tibbetts report is a reasonably complete view of the project, but please bear in mind that our main intent for the expansion is commercial fishing.

2. DESCRIPTION OF PRESENT NAVIGATION DIFFICULTIES. Presently the four fish handling facilities are located on the banks of the canal; therefore, boats must be tied up in the canal and offloaded, presenting navigational problems as well as a hazardous condition. Moreover, on the interior of the present harbor there is one pier for commercial fishing boats. The pier, designed for six, presently handles in excess of 35 boats. During the winter months when the recreational fleet is removed from the present harbor facility, the commercial vessels occupy those existing slips and still continue to raft off this one pier. Thus, we are left with two distinct difficulties:

a. Offloading in the Cape Cod Canal of fishing boats to handling facilities.

b. A grossly overcrowded facility for commercial vessels.

3. LANDING AND SERVICING FACILITIES IN THE HARBOR.

a. Commercial Landings. There are presently four fish handling facilities located on the banks of the canal (see attached form).

b. Recreational Landing. Presently there is one boat launching facility in the East Boat Basin.

c. Public Landings. The recreational landing described above also functions as a public landing. We would sincerely hope that in the new expanded facility increased public access would be achieved as the present landing is grossly over-used.

d. Boat Yards and Repair Facilities. There is presently no boat repair facility on site. We would propose that in the final site preparation, that land be provided for such a facility.

e. New Facilities Planned. With the proposed expansion we propose to create several fish handling facilities for off-loading within the new harbor. Moreover, we intend to have provided rack storage for recreational boats. Again, please consult the Tibbetts Report. It gives a general idea as to what type of facilities we will be striving for.

4. PRESENT USE OF THE HARBOR.

a. Fishing Industry. You should find that the Massachusetts Marine Fisheries has responded with great depth, providing you with adequate information in this area. We will be happy to provide any additional information.

b. Recreational Boating. The Harbormaster has provided your office with detailed information as to the extent of recreational boating. Again, if further information is needed, please contact us.

c. Charter Boats. Presently there are none at the existing facility and we are undecided as to whether they will be included in the final facility.

d. Ferries. None.

e. Other Commerce. None.

f. Special Problems. There is a special condition not necessarily a problem which exists at the East Boat Basin. The outfall of warm water from Canal Electric into the Cape Cod Canal occurs 400 yards to the west. This water tends to prevent the boat basin from icing. We would propose in the facility that a conduit be constructed from the canal outfall to the East Boat Basin, connected to perforated pipe which would lie at the bottom of the facility. Further, this conduit would be flooded with warm water in late Fall and shut off in early Spring, thus aiding this ice-free feature, yet helping to prevent the problem of ship worms.

5. STORM DAMAGE. The East Boat Basin presently functions as a harbor of refuge, and this of course would be preserved under the expansion program.

6. WOULD YOUR COMMUNITY BE WILLING TO CONTRIBUTE MONEY TO THE IMPROVEMENT OF THE HARBOR? Prior to the involvement of the Corps of Army Engineers, the Town of Sandwich purchased 22 plus acres of land adjacent to the present facility. However, we realize that this commitment is merely just the beginning. There will be expenditures of funds for bulkheading, for site preparation, relocation and location of utilities, and a host of ther shore facilities. The funding for the above improvements will be sought through a combination of private and local funds. Thus, the Town of Sandwich is very aware that it must contribute to make the expansion of the East Boat Basin a success. We are currently pursuing additional Federal funds to accomplish adequate site preparation, the first step in an arduous process in obtaining needed funds.

Very truly yours,

BOARD OF SELECTMEN

David P. Persson

DPP/jb

Enc.

TOWN OF SANDWICH

THE OLDEST TOWN ON CAPE COD

SANDWICH, MASSACHUSETTS

TELEPHONE 888-4200

OFFICE OF THE:
BOARD OF SELECTMEN
BOARD OF ASSESSORS

January 19, 1981

Colonel William E. Hodgson, Acting Div. Eng.
Department of the Army
New England Division, Corps of Engineers
Waltham, MA

Dear Colonel Hodgson,

The Sandwich Board of Selectmen would like to express their sincere appreciation for having this opportunity to review the Reconnaisance Report of Navigation Improvements for the East Boat Basin, Sandwich, Massachusetts. We find that the report has captured the critical nature of the existing problems with respect to commercial berthing and off-loading. Moreover, you have analyzed the critical economic problem Sandwich faces -- unemployment. It should be noted that the unemployment problem, clearly at its worst during the winter months, remains considerably higher during the summer months than Barnstable County or indeed the Commonwealth of Massachusetts.

We would like to emphasize three points concerning the expansion of the East Boat Basin. First, the Board of Selectmen wish to place clear and definite emphasis upon commercial fishing within the expanded area. Recreational interests, we feel, can best be accommodated through the use of rack storage for smaller power boats and a better layout of slip space using the existing water space.

Second, we would like to point out that the Tibbets Report and the two layouts of expansion, are merely guides to indicate our interest in expansion. They should not be regarded as definite and absolute proposals, rather as tools to express our desires.

And third, it is essential that federal dollar participation in this project be maximized for this plan to succeed. The Town of Sandwich with its' $7,000,000. budget cannot afford a great share of the cost of "digging the hole". We understand clearly our financial responsibility concerning the bulkheads, piers, and docks, as well as the site preparation. Therefore, we request of the Corps of Army Engineers a design of expansion, commercially directed, which maximizes federal cost sharing.

Again, thank you for this opportunity to discuss these matters with you.

Very truly yours,

BOARD OF SELECTMEN

H. Eugene Carr
Chairman

HEC/jb